

Chemical Week

Price 35 cents

June 14, 1958



Metals makers' business woes are target of many-pronged antirecession drive . . p. 27

Ceramic coatings—heat- and corrosion-resistance backs bid for new markets . . p. 49

◀ Synthesis sets "Barthrin" on long road to markets. First look at new insecticide . p. 59

Opening a plant in Japan—in the lavish ceremony, a welcome for U.S. investors . p. 83

CW Report: Plan for your next plant shutdown. You'll save plenty p. 95

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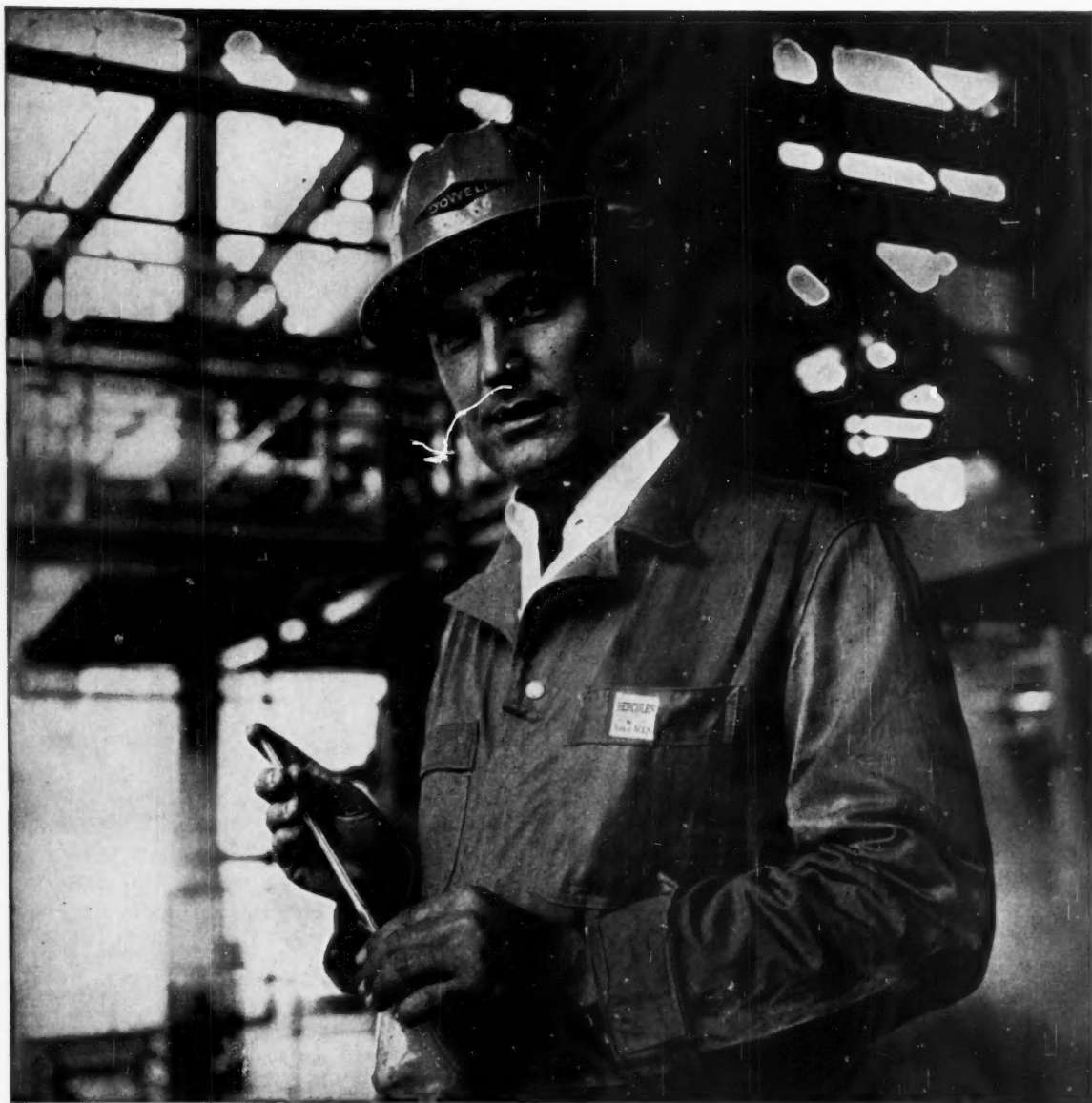
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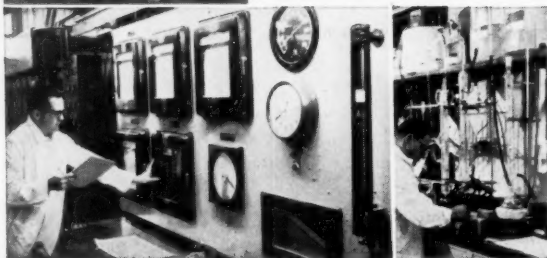
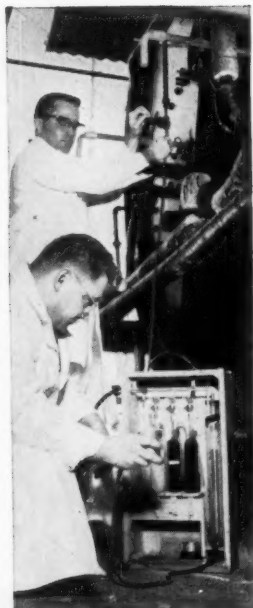




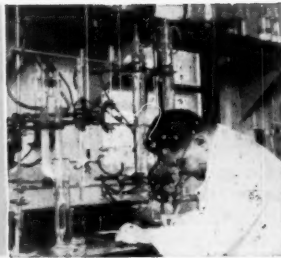
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TOP OF THE WEEK

JUNE 14, 1958

- ▶ **SEC's latest survey of capital spending plans** pegs chemical outlays for second-quarter '58 expansion at about \$372 millionp. 29
- ▶ **Aqueous processes for nuclear-fuel recovery** are still favored but AEC continues to seek more economic methods .. p. 39
- ▶ **Help your customer develop markets for his products.** That's IMCC's theme in new sales pushp. 57

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If shippers must pay for use of inland waterways, they should have a strong voice in how such funds are spent.

22 OPINION

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Makers of nonferrous metals are diversifying, pushing new-product development in an attempt to boost recession-cut earnings.

29 Process company expansion goals shrink again, according to latest SEC survey on capital expenditure plans.

30 Solvents producer seeks to combat scare publicity following unexplained tankcar blasts.

30 Though all-industry employment is rising, several chemical firms are making cutbacks.

30 Free plant for the asking: Sinclair closes refinery, deeds plant to town for any new industrial user.

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39 ENGINEERING

AEC plugs anew for private-industry aid in fuel reprocessing; probes for cheaper processes.

42 Jones & Laughlin studies steel-making via computer-simulated pilot plant.

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59 SPECIALTIES

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Careful scheduling of plant shutdowns can mean major savings in costs.

108 CHARTING BUSINESS

Latex producers make new strides in push for paint business—latex paints will account for 13% of nation's total paint gallonage this year.

40,114 copies of this issue printed

COVER PICTURE—COURTESY OF CALIFORNIA RESEARCH CORP., STANDARD OIL CO. OF CALIFORNIA

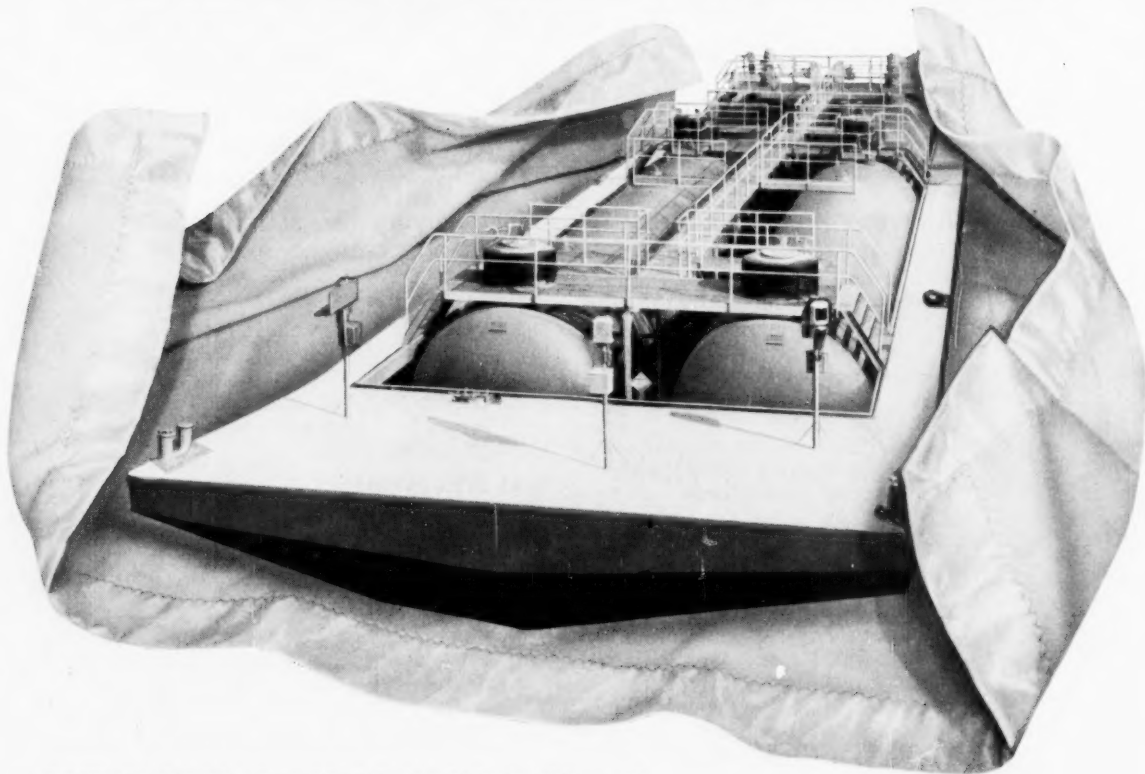
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No. 24

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Postmaster: Please send Form 3579 to Chemical Week, 330 West 42nd St., New York 36, N. Y.

INGALLS wraps an insulating blanket around 1200 tons of caustic soda!



Hull 992 is the first of three barges being built at Ingalls' Decatur, Alabama yard for Westvaco Chlor-Alkali Division of Food Machinery and Chemical Corporation.

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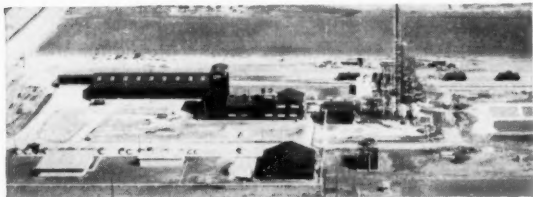
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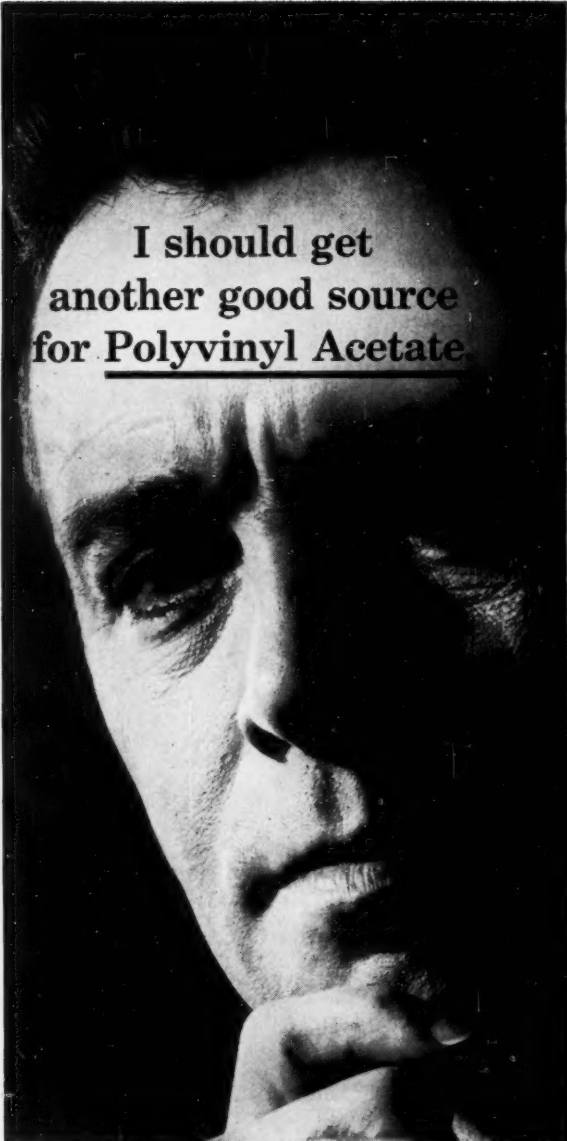
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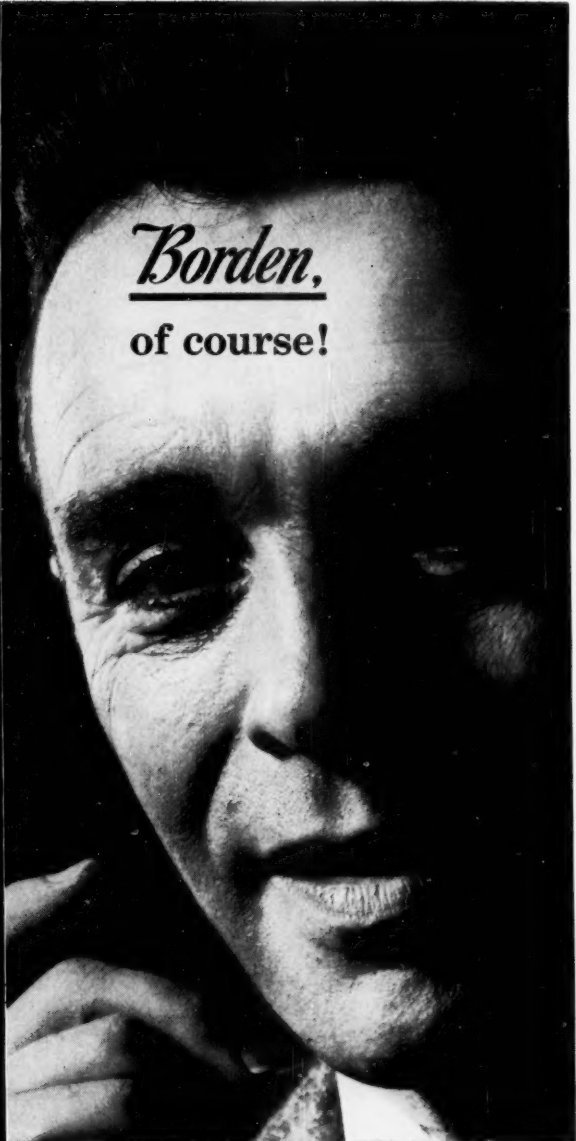
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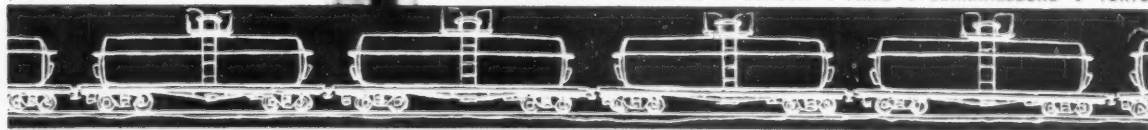
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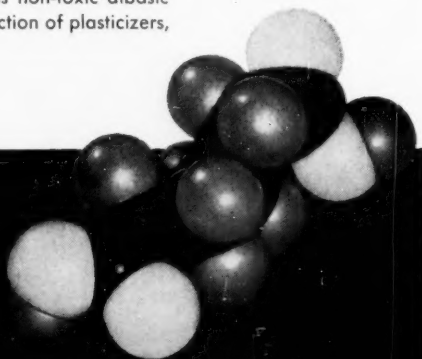
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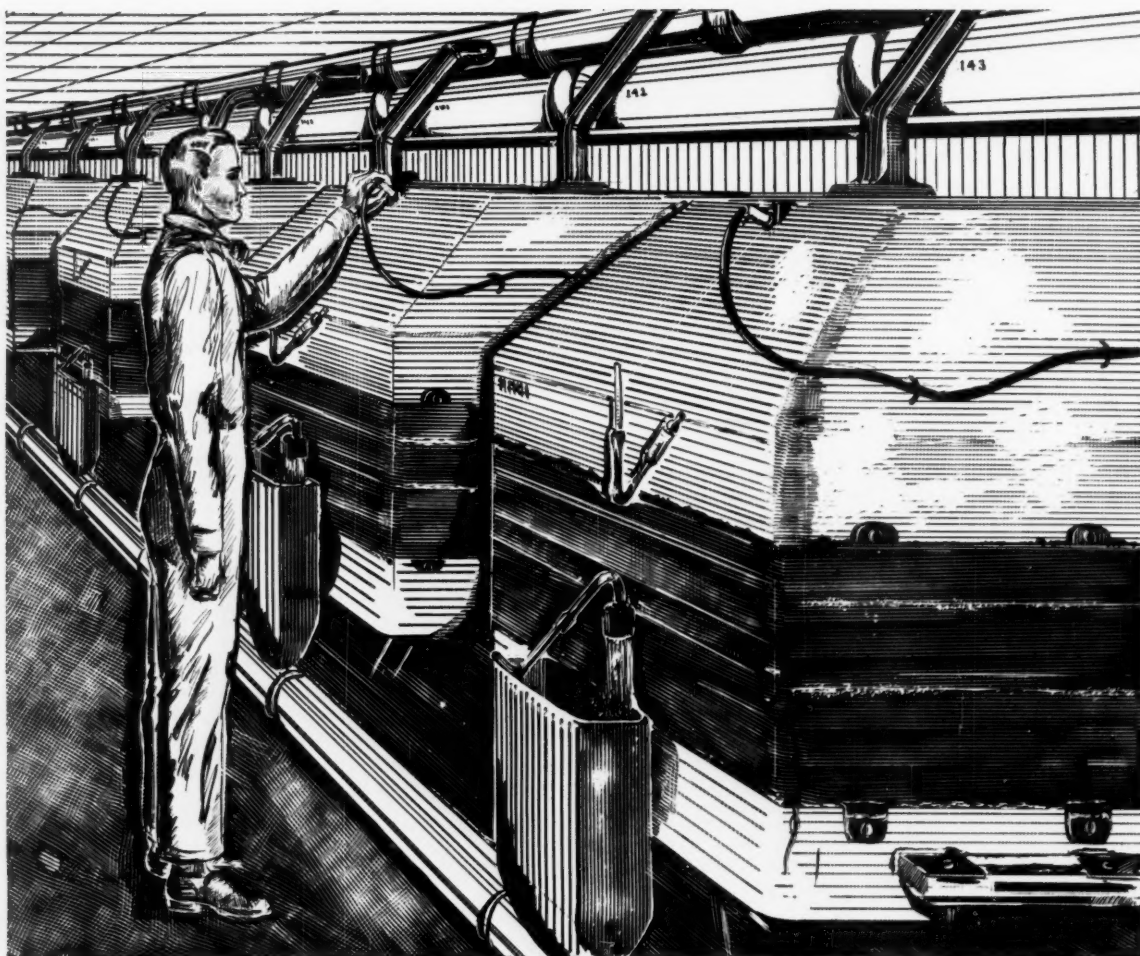
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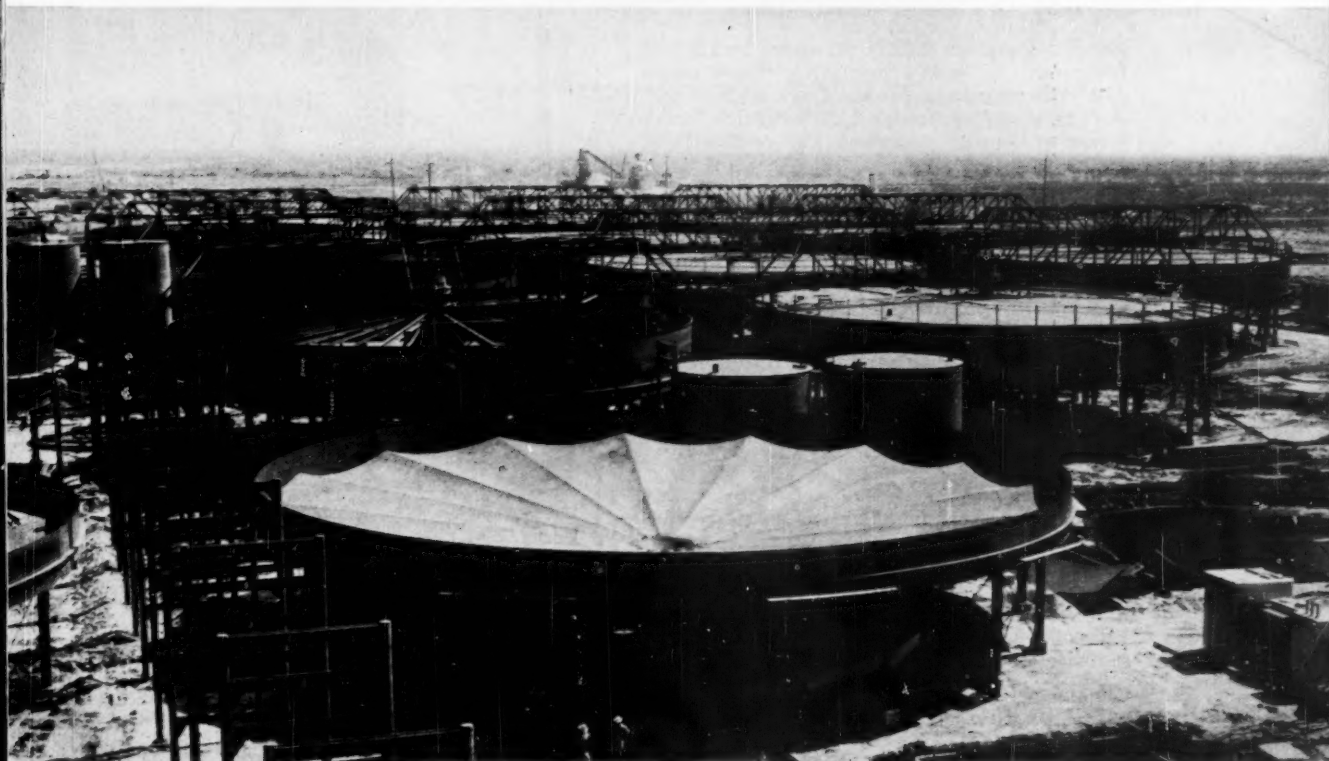


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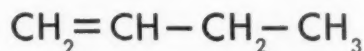
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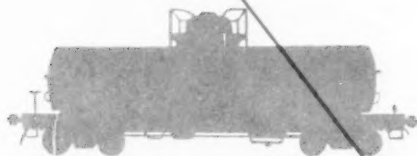
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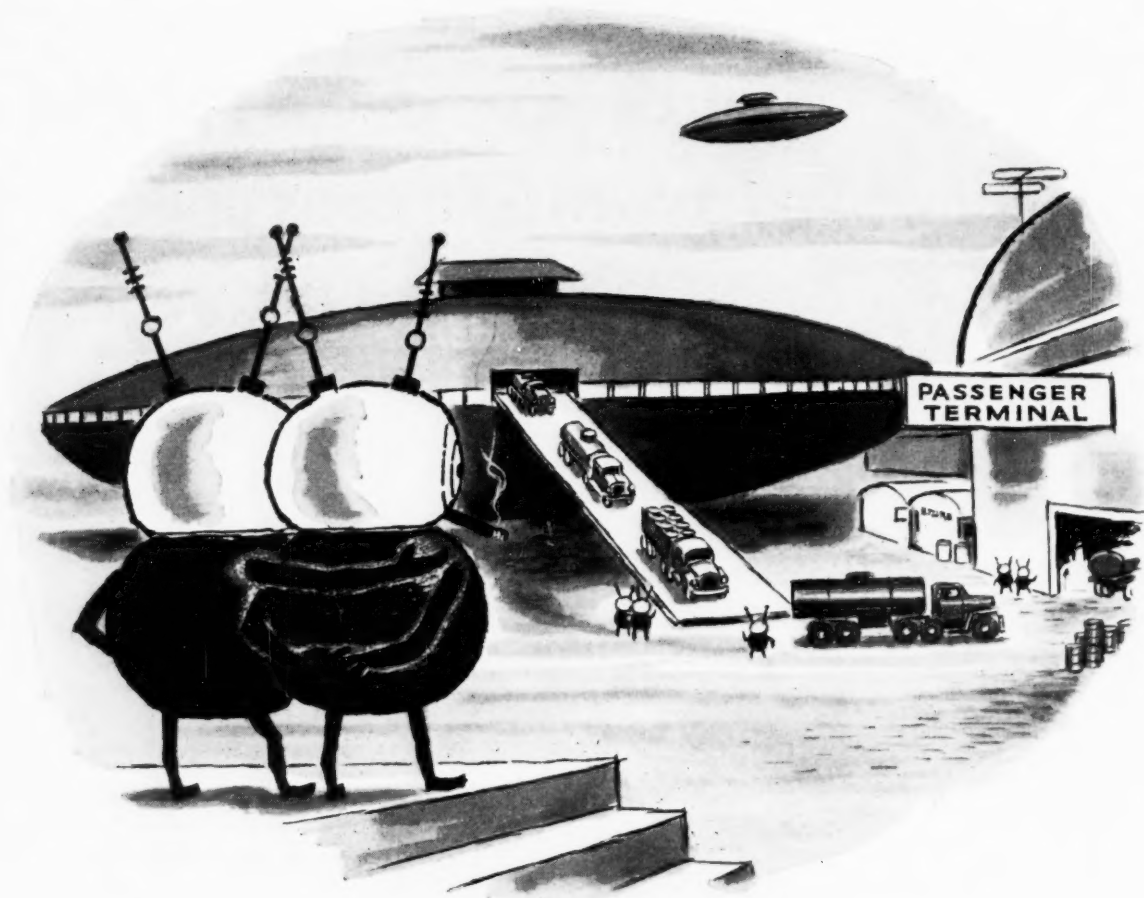
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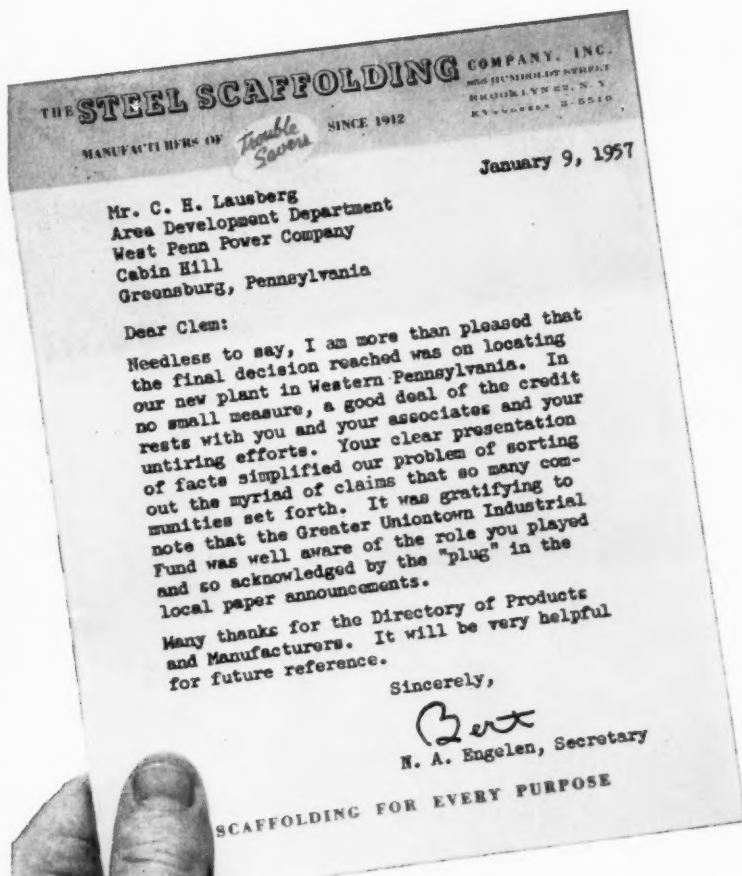
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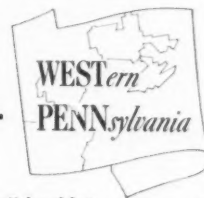
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Business Newsletter

CHEMICAL WEEK

June 14, 1958

The CPI is keeping legal mills grinding this week.

Of particular interest: Allied Chemical's civil suit against Dixon Chemical and Research (Clifton, N. J.), Dixon Chemical Industries and four Dixon employees who formerly worked for Allied. This suit—involving allegations by Allied that Dixon's proposed aluminum sulfate and hydrofluoric acid plants (*CW*, March 22, p. 24) would be based on Allied's technology—was scheduled to be tried this week in U.S. district court at Newark, N. J. In a preliminary hearing on Allied's request for early trial, a Dixon attorney denied that the defendants had "purloined" any of Allied's trade secrets.

- The Federal Trade Commission sent its case against Brillo Mfg. Co. back to a hearing examiner last week, ruling that Brillo's acquisition of The Williams Co. in '55 did not violate the Clayton Act simply because both companies held substantial shares of the steel wool market. By the same token, FTC ruled, a merger is not automatically legal because it involves only a small share of the market. In both cases, other factors—the number of competitors, the degree of concentration in the industry—must be considered.

- A drive against illegal, uniform bidding on state contracts has been launched in Texas by Atty. Gen. Will Wilson. Trouble started over contracts let by the city of Austin for chlorine, lime, oyster shell and electric transformers. But the investigation will be state-wide and involves a broad range of materials, including highway construction supplies. Lawsuits for injunctions and penalties will be filed this summer.

- Five complaints asking \$8.9 million in damages were filed last week against Union Carbide Corp., four of its former subsidiaries, and Vanadium Corp. in U.S. district court at Salt Lake City. And in U.S. district court at San Francisco, a complaint filed in '49 against the same defendant by one of the Salt Lake City plaintiffs, Continental Ore Co., went on trial. Damage claim: \$1.5 million. All the complaints allege that the defendants violated the Sherman-Clayton antitrust laws by controlling production of ferrovanadium and vanadium oxide.

•
Niagara Mohawk Power Co. wants to hike its rates again. But companies in Buffalo have let it be known they'll vigorously oppose any increase.

Harvey Busch, of National Aniline, who acted as spokesman for the 33 Buffalo area companies that banded together to fight the past two price boosts, called the power company's proposal "a breach of faith." He declared the group will certainly oppose "an increase of the magnitude proposed by Niagara Mohawk." Under NMP's new rates, industrial and commercial users in western New York would pay \$6.2 million of a \$10.5-million annual raise in power costs.

Business Newsletter

(Continued)

A "satisfactory" union contract or a probable loss of jobs—those were the alternatives Carborundum Co.'s president, Gen. Clinton Robinson, laid before the local membership of Oil, Chemical & Atomic Workers (AFL-CIO) late last week in Niagara Falls.

Obsolescence and relatively high labor costs, along with lower sales, are costing the company's largest division more than \$300,000/-month, Robinson told the union men. To improve efficiency, he said, Carborundum plans a \$48-million, four-year investment program, including a \$6-million vitrified wheel plant to replace present facilities. Whether the company builds in Niagara Falls or in Van Wert, O., depends primarily on the contract now being negotiated. Necessary terms: lower incentive payments, eventual substitution of group-rate for piece-rate incentives, no wage rises except for cost-of-living, and a long-term contract.

•
Evidence of growing Canadian nationalism in U.S.-Canadian business dealings continues to mount. Last week, individual shareholders of Crown Zellerbach Canada Ltd.—mostly Canadians—approved a plan giving them priority over the parent company in distribution of dividends.

And chemical process companies' executives—more than a dozen of them—are members of the recently established Canadian-American Committee, which is starting a three-year study of Canadian-U.S. problems.

•
Tranquilizers have paid off handsomely for Carter products, Inc., and now the company is going into combinations of tranquilizers with other medicinals. Last week, it started marketing Miltrate, in which Carter's tranquilizing base (meprobamate) is paired with a chemotherapy agent for angina pectoris (pentaerythritol tetranitrate).

Before a group of security analysts in New York this week, Carter President H. H. Hoyt revealed that earnings for the fiscal year ending March 31 amounted to \$5.6 million—a 25% increase over the '57 net. Much of this increase comes from royalties on licenses to make and sell meprobamate. Sales of Carter's own products climbed 1.6% to \$42.5 million—advertised products, \$19.5 million; ethicals, \$23 million.

•
Reichhold is now listed on the "big board." Its tape symbol: RCI. By noon Monday, the first day of listing, more than 1,200 shares had been traded.

Since Reichhold's latest issue, late in March, the price of its stock has risen from 25½ to about 34. Company's explanation: good earnings performance and sales of \$6 million-plus both in April and May.

Other companies report fair sales. Carbide says its May volume was about that of first-quarter months; Du Pont reports a "slight pickup" is expected when May totals are computed.



This new packaging idea created an \$85,000,000 market

Here's a simple packaging idea with the power to completely change consumer ideas of how a product should perform. Aerosol packaging created an \$85,000,000 market for hair fixatives and has revolutionized sales for insecticides, shave creams, colognes and a host of other products. If your product can be brushed, poured or sprayed, you might add new consumer appeal—create a positive competitive advantage if you packaged it in an aerosol.

Sales records and marketing data prove the appeal of aerosol packaging. In a recent survey of the market for hair preparations, 95% of users preferred the aerosol hair fixative and 83% of users preferred aerosol hair dressings. The main reason for each was that aerosols deliver the product in a

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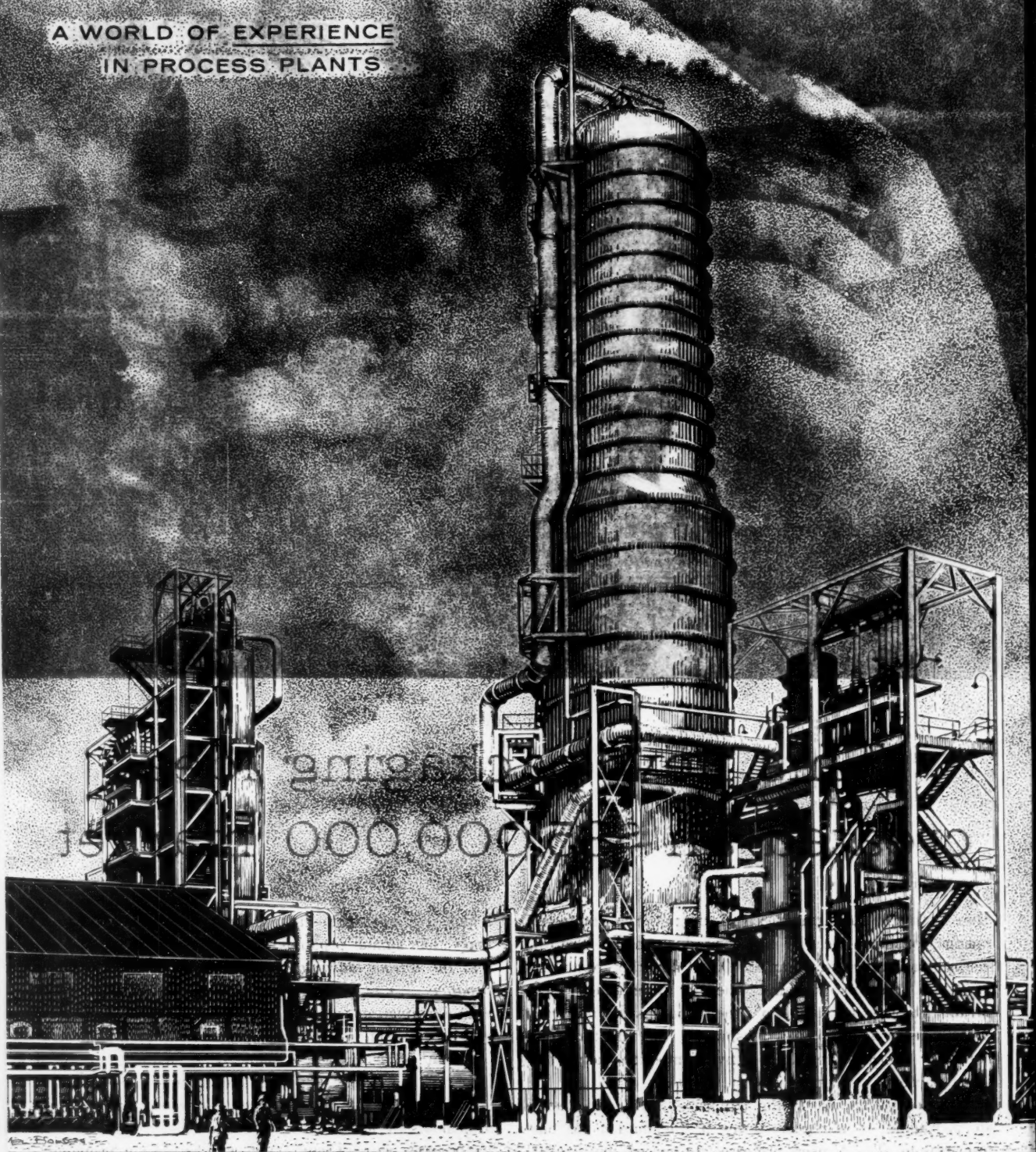
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Should shippers pay tolls for the use of inland waterways? It's not a simple question, and the answer—yes or no—is bound to affect the prices of a great many chemicals and raw materials. At the behest of the Budget Bureau, the Department of Commerce is now studying the question. Under consideration are fees sufficient to cover waterway maintenance and operation.

At first glance the proposal looks sound. Truckers pay license fees to the various states for use of the highways; railroads pay property taxes to the states; municipal public carriers pay franchise taxes to the cities; commercial airlines pay for use of publicly owned airports.

But, on the other hand, all modes of transportation have enjoyed some form of public subsidy. The federal and state governments have spent far more on roads than have the users; the Western railroads received land grants that not only served as rights-of-way but also provided income; airlines have been subsidized for carrying mail. All this is based on the concept that we need all of these types of transportation for economic health and military preparedness—and what benefits the whole should be largely paid for by the whole.

Certainly the chemical process industries have a stake in maintaining present national policy. Most CRI companies use big users of the waterways; many plant sites were chosen primarily for access to waterways, inasmuch as low-cost shipping is fundamental to the economics of low-price bulk commodities.

Nevertheless, Congressional abuse of rivers and harbors legislation for tax-plurging "pork-barrel" purposes emphasizes the need for a more equitable and economical means to finance waterways. Public hearings should be called to elicit thoughtful proposals.

Howard C. E. Johnson

Editor-in-Chief

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OPINION

Dow Makes DDPA

TO THE EDITOR: Your article "Switch to Solvent Hikes Uranium Recovery" (*March 1, p. 60*) was read with interest. However, we were alarmed to see the statement . . . that dodecyl phosphoric acid (DDPA) is not commercially available [and that] Vitro is making its own. . . .

DDPA is available from Dow Chemical Co. as Dowsol-12 and was available long before the completion of Vitro's Solvent Mill in Salt Lake City.

MERRILL F. MCCARTY
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Midland, Mich.

Vitro tells us that DDPA was not commercially available at the time the plant was being designed and built. Now that it has the facilities, it is still making its own.—ED.

More on Michaelis

TO THE EDITOR: We were glad to see your story "At Issue: Atomic Profits" (*March 8, p. 37*) and to note your remarks regarding the testimony given by Michael Michaelis, head of our Nuclear Management Services, to the Congressional Joint Committee on Atomic Energy. We are somewhat concerned that the remarks attributed to Mr. Michaelis seem to be taken out of the general context of his complete testimony.

Mr. Michaelis's purpose, as stated in his testimony, was "to recommend serious consideration of a new interim fuel-price policy as a means of achieving our national objectives for nuclear power development." All his comments regarding nuclear fuel prices and possible government assistance should be read in relation to the italicized portion of the above quotation.

He said that the present domestic development program "is yielding results which indicate that economical nuclear power will become available in this country in sufficient time for our economic needs." However, he suggested that, if further acceleration of our nuclear power program is deemed essential for national reasons, the use of taxpayers' money appears

justified for this purpose. In that case "a carefully conceived government price schedule that reduces net fuel costs for reactor operators would stimulate immensely the immediate construction of nuclear power plants—both privately and publicly owned." The latter feature we believe to be one of Mr. Michaelis's most important points.

This form of government assistance "would not favor either public or private ownership of power plants, since it would enable both *equally* to use available capital to finance the proportionately high costs of capital nuclear equipment." Previous proposals for an accelerated nuclear power effort have repeatedly run afoul of the issue of public versus private ownership.

IRVING TELLING
Director of Public Relations
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Although we deny distortion of Mr. Michaelis's testimony, we agree that our brief report couldn't provide the complete context of his remarks.—ED.

MEETINGS

Gordon Research Conferences, series of 36 topics, Colby Junior College, New Hampton School and Kimball Union Academy, all in New Hampshire, ends Aug. 29.

American Assn. of Cost Engineers, second annual meeting, Case Institute of Technology, Cleveland, June 16-18.

American Society for Engineering Education, annual national meeting, University of California, Berkeley, June 16-20.

Heat Transfer and Fluid Mechanics Institute meeting, University of California, Berkeley, June 19-21.

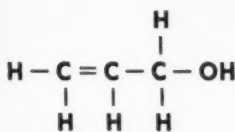
American Chemical Society, Division of Medical Chemistry, sixth national symposium, University of Wisconsin, Madison, Wis., June 22-25.

American Society of Agricultural Engineers, annual meeting, University of California, Santa Barbara, Calif., June 22-25.

American Society for Testing Materials, annual meeting and exhibit, Statler Hotel, Boston, June 22-27.

American Institute of Chemical Engineers, 50th anniversary celebration, Bellevue-Stratford Hotel, Philadelphia, June 22-27.

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Specific gravity at 20/20°C. 0.852-0.855
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APHA color, maximum 15

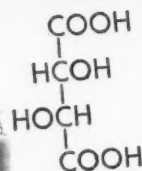
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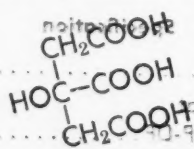
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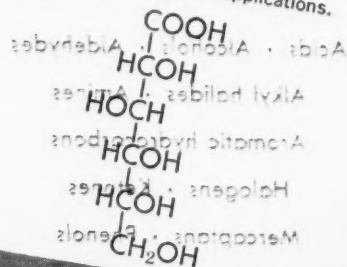
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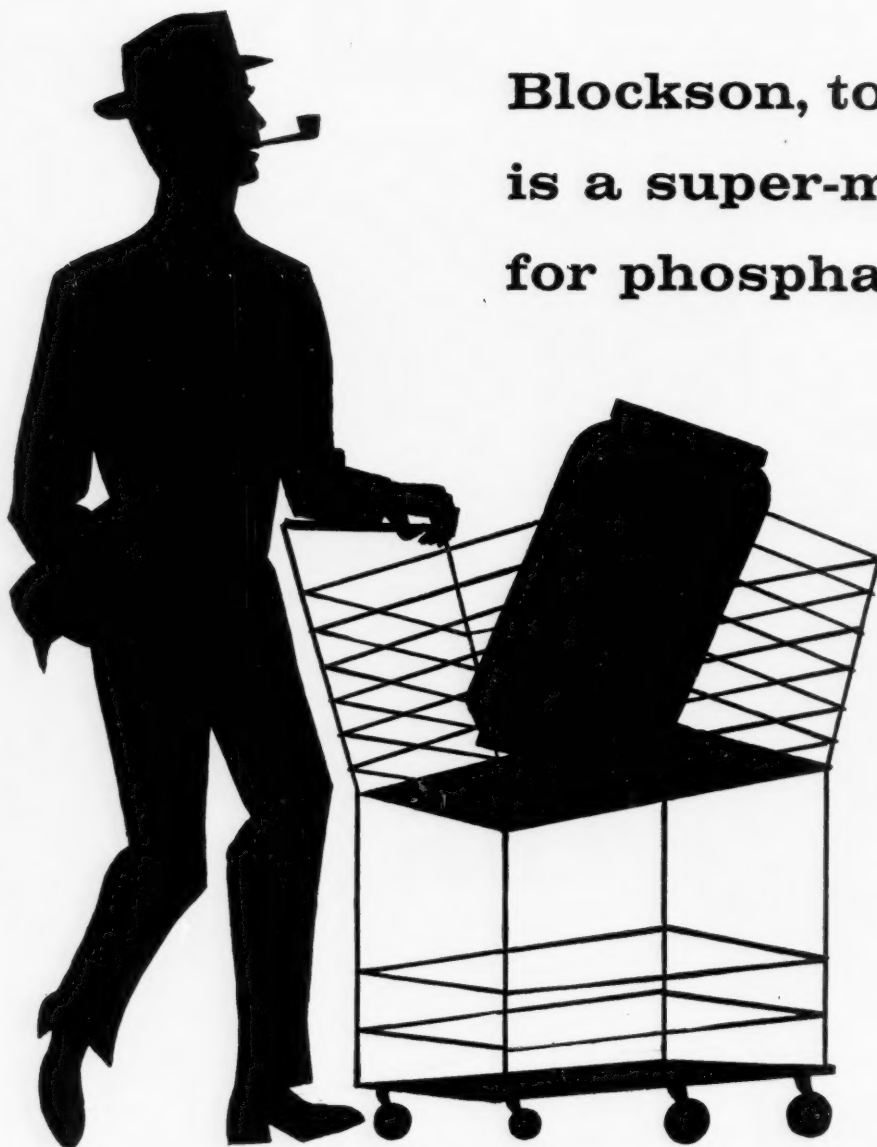
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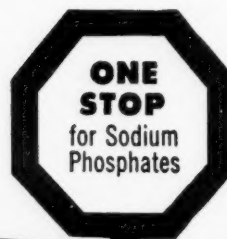
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At Alcoa's Badin aluminum smelter, \$37 million for expansion, modernization, and a new dam.

Metals Makers Build for Better Business

Chemical-metals makers — their sales and earnings sharply down in what has been called a "metals recession" — are energetically doing things to pull themselves out of the slump. Alcoa's decision last week to put \$37 million into new aluminum expansion in North Carolina is the latest in a current rash of integrations, diversifications and expansion.

Alcoa's plans include \$16 million to build a dam at Tuckertown, N. C., and a \$21-million modernization and expansion of its aluminum smelter at Badin, N. C. Federal Power Commission last week okayed Alcoa's plans for the dam, giving the company a 50-year power lease.

The Tuckertown project will add about 40,000 kilowatts to the present capacity of 135,000 kw. generated by three other dams—all on the

Yadkin River—in Alcoa's power system. Construction at the Badin smelter will be spread over a three-year period to avoid production losses while the dam is being built. Engineering studies on both phases are under way.

Transformer Hopes: Late in April, before deciding to proceed with the North Carolina program, Alcoa bought the transformer division of Automation Instruments, Inc. (Boulder, Colo.). Object: to develop uses for aluminum foil and sheet strip-windings in transformers and other electrical equipment. This research is still in the beginning stages, but is promising. It could yield a large new outlet for aluminum.

Elsewhere, Reynolds Metals—the only metals producer to show an increase in first-quarter sales and earn-

ings (*table, p. 28*)—reports its '58 sales are increasing every month.

Another encouraging prospect, says Reynolds Vice-President and Director John Croy, is the "Big Three" auto makers' interest in building all-aluminum engine blocks—a potential 600-million-lbs./year market.

On the other hand, there have been many slowdowns and layoffs in the aluminum industry. Reynolds reports it is currently operating at only 75% of primary aluminum capacity. Others report similar cutbacks. And shipments for government stockpiling, which amounted to roughly 25% of all aluminum sales last year, are tapering off. All contracts will run out either this year or next.

Other Metals Hit: The picture is about the same for other nonferrous metals. But here, too, the companies

How Earnings Slump Hit Metals Industry

	Sales 1st qtr. '58	Change from 1st qtr. '57	Earnings 1st qtr. '58	Change from 1st qtr. '57
	(million dollars)		(million dollars)	
Alcoa	\$181.5	down 13.0%	\$11.5	down 38.4%
Aluminium Ltd.	101.6	down 17.3%	5.3	down 64.4%
Am. Smelting & Ref.	102.6	down 29.0%	4.0	down 51.5%
Cerro de Pasco	21.8	down 18.4%	0.5	down 64.2%
Eagle-Picher	24.2	down 24.1%	0.5	down 63.0%
Fansteel	6.9	down 18.5%	0.4	down 53.4%
Footc	5.7	down 14.4%	0.5	down 20.1%
Int. Nickel	85.2	down 22.5%	12.2	down 48.0%
Kaiser	99.8	up 2.3%	6.4	down 22.4%
Kennecott	84.8	down 36.6%	11.7	down 58.1%
Lithium Corp.	3.6	down 24.5%	0.3	up 14.3%
Metal & Thermit	8.5	down 26.0%	0.2	down 58.2%
National Lead	102.0	down 31.1%	9.0	down 39.5%
Reynolds Metals	115.6	up 9.9%	9.9	up 0.3%
St. Joseph Lead	18.2	down 42.3%	2.4	down 12.1%

are launching multipronged attacks on recession.

Kennecott Copper last month bought American Smelting and Refining's Garfield, Utah, smelter as a start toward integrating its entire copper operation, from mining to smelting.

Cerro de Pasco, until a few years ago strictly a copper producer, has diversified into production of lead, zinc, silver, gold, aluminum, oil and gas. More recently, it has gone into hydroelectric power units, housing, hospitals and even sheep- and cattle-ranching. Says Cerro de Pasco president Robert Koenig: "We continue to . . . look for other established busi-

nesses that advantageously might be combined with the Cerro de Pasco group of companies."

Copper to Asbestos: Coppermaker American Smelting and Refining, recently diversified into mining asbestos (see picture), is dredging Black Lake in Quebec, hopes to dig out 37 million cu. yds. of ore and process it into all grades of asbestos (CW, July 13, '57, p. 30).

Producers of the rarer metals also aren't overlooking long-term benefits from integration and expansion.

National Distillers and Chemical last month leased—and will later purchase—the large titanium tetrachloride unit built by Stauffer Chemical

in Ashtabula, O. This will give Distillers an integrated titanium operation, from sponge processing to production of the metal.

Magnesium Picking Up: While titanium producers are estimated to be operating as low as 25% of capacity, magnesium makers report business is slowly picking up. Production isn't what it was in the peak year of '56, but it's improving—Dow says April magnesium sales were 12% ahead of those in March.

Among the smaller-volume metals producers, Beryllium Corp. (Reading, Pa.) is starting production of calcium-metal mill products. Although calcium has never been a large-volume item, the company is counting on development work now under way to spark demand for the metal in a variety of mill shapes.

Other developments include a new tantalum producing unit scheduled to come onstream in November at Kawecki Chemical's Boyertown, Pa., plant; a \$1-million, 800,000-lbs./year molybdenum plant to be built by American Metals Climax at Coldwater, Mich.; a reported increase in the use of lithium for defense needs; and generally stepped-up research throughout the entire metals business.

Success of these new approaches won't be known for several months. But it's evident that metals makers are launching an all-out battle against recession woes, and—despite the current slump—are standing by their earlier optimistic predictions.

Three ways metal makers are countering earnings dip

DIVERSIFICATION



American Smelting dredges asbestos ore from Canadian lake.

NEW APPLICATIONS



Alcoa and others research use of aluminum foil in electrical equipment.

VERTICAL INTEGRATION



National Distillers is buying this unit to make titanium tetrachloride.

CPI Spending for New Plants and Equipment (million dollars)

	First Quarter '58			Second Quarter '58			'58 Third Quarter
	February estimate	Actual spending	Change	February estimate	Current estimate	Change	Current est.
Primary nonferrous metals	\$ 177	\$ 151	down 14.7%	\$ 122	\$ 135	up 10.7%	\$ 95
Stone, clay and glass products	115	102	down 11.3%	114	108	down 5.3%	106
Paper and allied products	170	141	down 17.1%	156	162	up 3.8%	142
Petroleum and coal products	744	587	down 21.1%	748	746	down 0.03%	721
Rubber products	43	37	down 14%	47	39	down 17%	43
Chemicals and allied products	428	340	down 2.8%	415	372	down 10.4%	346
CPI total	1,677	1,358	down 19%	1,638	1,562	down 4.6%	1,453
All manufacturing	3,466	2,898	down 16.4%	3,319	3,235	down 2.5%	2,987

Figures compiled by Dept. of Commerce and Securities & Exchange Commission.
Not seasonally adjusted.

Capital Spending Cutback for CPI

As the recession goes into its fourth quarter, chemical process companies' capital spending plans are being revised downward. The latest quarterly survey by U.S. Dept. of Commerce and Securities & Exchange Commission, out this week, throws light on the deepening retrenchment in the CPI and industry in general.

When the last survey was taken, during late January through early March, the CPI estimated it would trim '58 capital spending to \$6.4 billion—15.8% below the \$7.6 billion it had spent in '57 (*CW*, March 22, p. 21). All business planned a 13.2% cut.

Long, Cold Winter: The cold economic winter froze talk of an early upturn, and spring brought few signs of thaw. CPI management sharpened their cost-cutting knives, slashed '58 spending plans deeper—more so than the rest of industry.

In May, the survey shows, estimated CPI capital spending in '58 was down to \$5.8 billion—9% below the earlier estimate, and 23% below actual outlay in '57. For all manufacturing industries, '58 spending plans shrank 9.1%—from \$13.2 bil-

lion to \$12 billion. But for business as a whole, the cutback was only 4%—from \$32 billion to \$30.7 billion, bringing '58 expenditures down 17% from the '57 level.

Within the CPI, the chemicals and allied products segment made the largest relative cut in '58 spending plans. Their total plunged 14.1%—from \$1.6 billion last winter to \$1.4 billion in May. The other cutbacks: nonferrous metals, from \$470 million to \$462 million; stone, clay and glass products, from \$448 million to \$408 million; paper and allied products, from \$622 million to \$570 million; petroleum and coal products, from \$3.1 billion to \$2.8 billion; rubber products, from \$170 million to \$163 million.

Second Looks: Government analysts say they are not surprised by these cuts. "In January and February," one expert explains, "businessmen were still trying to assess the downturn. They were hoping for the best. Now they figure they know the worst, and their downward revisions are the result."

The quarter-by-quarter breakdown of the changes in spending plans (table) highlights some trends with-

in the downward pattern.

There was a particularly sharp cut in the metals industry. That industry trimmed '58 spending plans 1.7% since February, now plans to slash expenses 43.2% below last year's levels. Its current estimate for third-quarter spending is \$95 million—29.6% below estimated second-quarter spending and the biggest cut in the CPI. And if the year-long estimate is borne out, fourth-quarter expenditures will drop still further—to \$81 million. Despite these drastic cuts, the current estimate for second-quarter spending is actually 10.7% above the February estimate.

Paper and allied product companies' predictions show a similar quirk. The industry now plans a 29.7% cut in '58 spending, compared with that of last year. And it looks towards the third-quarter outlay to drop 12.3% below estimates for the second quarter. Yet the new estimate for the second quarter has risen 3.8% above the estimate made in February.

In assessing the '58 outlook, SEC analysts caution, an important fact to remember is that last-quarter outlays often exceed estimates.



Fighting flames from second nitromethane blast in six months.

Blasts Put Solvent 'on Trial'

Commercial Solvents Corp. (New York) was having transportation troubles last week, after a tank car of nitromethane en route from Sterlington, La., to Peoria, Ill., blew up at the small town of Mt. Pulaski, Ill. Tank-car shipments of the chemical have been banned; and now CSC can only await the final ruling of the Interstate Commerce Commission.

It was the second blast of a nitromethane car in five months. This time, two railroad men were killed, more than a score of people injured, and two-thirds of the town's 1,500 residents made temporarily homeless. Damage was estimated at over \$1 million.

Last January in Niagara Falls, N.Y., another nitromethane tank-car explosion injured 180 people and destroyed property worth more than \$1 million.

Time for Action: When the second car blew up late Sunday afternoon (June 1), Commercial Solvents moved fast. By early evening, nine company officials were on the scene, along with railroad and insurance men.

Next day, Commercial Solvents banned all tank-car shipments of nitromethane, which hasn't yet been classified as an explosive. But the

company asserted that the cause of the blast had not been determined, that reportedly there were other chemicals on the train.

Later the same day, Assn. of American Railroads, under Interstate Commerce Commission orders, prohibited all tank-car shipments of all nitroparaffins. (There are four basic chemicals, including nitromethane, in the banned group. Bills of lading carry only the group classification.) The company objected to the over-all ban, pointing out that in the same train a tank car of 2-nitropropane had been struck by flying fragments and burned without exploding. ICC then limited the ban to nitromethane. ICC, however, did not halt drum shipments of the compound.

The ban will continue until the cause of the explosions has been determined. Commercial Solvents has been producing nitromethane for about 20 years, has been shipping tank-car quantities for the past few years from its Sterlington plant. Until the two explosions, this year, there had been no accidents. Unless the investigations reveal new properties of the chemical, chances are good that it will not be reclassified as an explosive and that tank-car shipments will be resumed.

Salaried Ranks Hit

The slump is still making inroads on various chemical process communities. And salaried employees as well as production workers are affected in the latest cutbacks:

- Dow Chemical plans to lay off 600 salaried employees at Midland, Mich., by Sept. 1. Also by that date, total employment in Dow's Texas Division is expected to be down to 5,100, compared with last December's 6,200 level. Dow explained that "the salaried share of our total sales dollar has climbed steeply in recent years and now is out of line with other operational costs."

- Stauffer Chemical expects to close its 30-year-old carbon bisulfide plant at Roanoke, Va., next month.

- Kaiser Aluminum & Chemical will shut down its aluminum reduction plant at Tacoma, Wash. And at the company's Metallurgical Research unit in Trentwood, Wash., layoff of 30 employees May 15 and another 30 on June 15 will bring the staff down to 80 employees.

- Texas Co. now says it will continue to operate its refinery at Sunburst, Mont., but at considerably reduced level. Previously, it had planned to close the refinery in October, and there had been rumors that the plant might be dismantled or sold.

Stauffer said the Roanoke shutdown was due to general economic conditions and also to the importing of foreign rayon into the U.S. market "at prices lower than in the country of origin."

Plant Offered 'for Free'

Sinclair Refining Co. is shutting down its Wellsville, N.Y., refinery, but its goodwill stays on. To help attract a new employer for its 300 former workers, Sinclair gave Wellsville the plant property; 4,100-kw. steam electric power plant; several brick buildings, including two 2-story office buildings; and the 80-acre riverside plant site.

Wellsville, in turn, is offering these facilities to any sound, growing company that can put them to commercial use and "will share its future with us," said Mayor Leo Ludden.

The 300 experienced refinery employees will likely remain in Wellsville, available for employment; 500 are available from nearby areas.

COMPANIES

Utah Salt Co. has been organized by a group of metal miners in the Great Salt Lake area to take advantage of lowered freight rates for salt shipped from Utah to the caustic chlorine producers in the Pacific Northwest. The new concern will get its salt from ponds near Wendover, Utah, owned by Bonneville Ltd., producer of potash by solar evaporation.

Hercules Powder Co. last week won a U.S. Army contract for nearly \$15 million for manufacture of propellents and propulsion systems for rockets and guided missiles.

West Virginia Pulp and Paper Co. (New York) is consolidating into a single unit the management and sales personnel and the four plants of the two multi-wall bag companies it recently acquired. The new Multiwall Bag Division will be administered from New York, with operating responsibility shared by regional managers based at New York and New Orleans. The four plants previously operated by Fulton Bag and Products Co. and Arkell & Smith are located at Wellsburg, W.Va.; Mobile, New Orleans and St. Louis.

EXPANSION

Citric Acid: One week after the federal government leveled a citric acid antitrust suit at Pfizer (*CW*, June 7, p. 15), Miles Laboratories (Elkhart, Ind.) says it plans a \$4.5-million expansion at Elkhart to more than double its citric output. Miles Executive Vice-President Edward Beardsley says it will enable the company "to become a substantial factor in the market." The company's citric production has been largely for use in its pharmaceutical products. New construction is expected to be started by early fall and to be completed in about a year.

Coal Carbonization: If Congress enacts the pending bill to double the acreage of public coal lands that can be leased by a single company, Union Pacific Coal Co. will build a \$3-million coal carbonization plant at Rock Springs, Wyo. Gov. Milward Simpson says enactment of the bill would open the door for a \$50-150-million synthetic-fuels industry and for development of iron ore deposits in southeastern Wyoming.

Petroleum Products: Western Operations, Inc.—subsidiary of Standard Oil Co. of California—is launching an estimated \$33-35-million expansion program at its refinery in Richmond, Calif. Principal new unit: a 40,000-bbls./day catalytic cracker, contract for which has been awarded to The Fluor Corp. Other

additions will be a waste-heat boiler, an alkylation unit and an isomerization unit. Construction will begin immediately, with completion scheduled for summer of '59.

Phthalate Plasticizers: Following the recent doubling of its phthalic anhydride capacity, Pittsburgh Coke & Chemical Co.'s Industrial Chemicals Division now will increase phthalate plasticizer capacity by 50%.

Oxygen, Nitrogen: Union Carbide Corp.'s Linde Co. Division will build a 300-tons/day plant at Pittsburg, Calif., to produce liquid oxygen and liquid nitrogen for West Coast missile industries. Carbide President Morse Dial says the first section, with capacity of 115 million cu.ft./month, will begin operation in June '59; the entire plant, with total capacity of 220 million cu.ft./month, will be onstream several months later. Last month, Linde announced it will build a 1,000-tons/day high-purity gaseous oxygen plant near Pittsburg, Pa. Seven other Linde oxygen plants have gone onstream or into construction so far this year.

High-Octane Alkylate: Carter Oil Co. is starting construction of a hydrofluoric acid alkylation unit—capacity, 2,300 gal./day—as the second phase of a \$2.4-million expansion-improvement program at its Billings, Mont., refinery. The new unit—being built by Refinery Engineering Co. (Tulsa, Okla.)—will be completed by next spring.

FOREIGN

Chlorine-Caustic/Italy: Societa Larderello—a government-controlled electrical power utility—plans to build a \$4-million chlorine-caustic plant at Massa Carrara, south of La Spezia. The site is near the Volterra salt deposits and the Larderello power station. Private chemical companies are protesting the plan, claiming that output of chlorine and soda in Italy is already double the demand.

Phosphorus/Yugoslavia: Tovarna Dusika—nitrogen compounds producer—is offering to buy equipment and know-how for production of phosphorus and phosphoric acid at its Maribor works. It reportedly has invited three Italian concerns—Montecatini, Saffa and Bascini—to negotiate for licenses and machinery.

Chemicals/Argentina: The Argentine government will receive bids until June 23 on three of eight formerly German-owned chemical and pharmaceutical firms it took over during World War II. First up for public auction are Merck Quimica Argentina E.N., Quimica Schering E.N., and Gunther Wagner S.R.L. Bids of 20 million, 17.2 million and 8.2 million pesos, respectively, have come from former parent firms.

**CHEMICALS***3M Chemicals opening new worlds of use for elastomers, stamped metal, electrical devices, epoxies*

KEL-F® ELASTOMER, a 3M Chemical Product, increases service life 8 to 10 times for the anodizing racks being loaded here with parts. It's the base of the coating protecting these racks made by Automotive Rubber Company, Inc., Detroit, Michigan.

KEL-F® ELASTOMER SURVIVES 400-hr.

Recent independent laboratory tests demonstrate the extraordinary performance of KEL-F® Elastomers. After being immersed in an anodizing bath solution 85% by weight of 85% phosphoric acid and 15% by weight of 67% nitric acid for 400 hours at 205°F, new coating compounds based on KEL-F Elastomers showed no breakdown.

This extraordinary performance is due largely to the properties of KEL-F® Elastomers, versatile 3M Chemicals with amazing resistance to corrosives, great thermal stability, exceptional resistivity and high dielectric strength.


Thanks to the excellent chemical resistance of KEL-F Elastomer, anodizing racks such as those shown above, may survive indefinitely unless mechanically damaged.

Such mechanical damage can be quite easily repaired. Compared to other synthetic elastomers or plastisol, KEL-F Elastomer offers exceptional durability. The result? Rack users can save the initial cost of KEL-F Elastomer-coated racks in a few months. Then, throughout their subsequent long life, the racks continue to serve cost free.

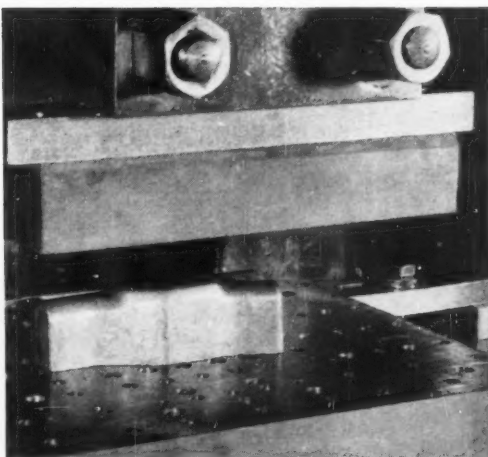
Such a performance suggests many applications in chemical processing and electrical manufacturing for KEL-F Elastomers, a product of the JERSEY CITY CHEMICAL DIVISION of 3M.



The other 3M Chemicals on these pages may well open new profit opportunities for you, too. Investigate. For information, write: 3M Chemical Products Group, 3M, Dept. WE-68, St. Paul 6, Minnesota.

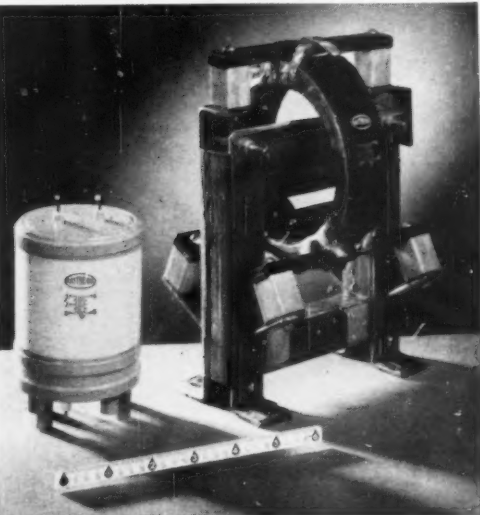


NEW RESIN DIES made with steel-based 3M Brand Tooling Compound 113 end weighing, pot-life and toxicity problems. They dry and cure faster, have high impact strength. Perform as well as steel dies on presses exerting up to 85 tons, on runs up into thousands. **HASTINGS CHEMICAL DIVISION.**



3M FLUOROCHEMICAL INERT FLUIDS used as coolants in Raytheon, Inc., transformers like these reduce size and weight as much as 75% without power loss. Smaller coils can be used, less outside insulation space is required. Fluorochemicals combine chemical inertness, thermal stability, high dielectric strength. **FLUOROCHEMICALS DIVISION.**

NITRIC ACID ATTACK



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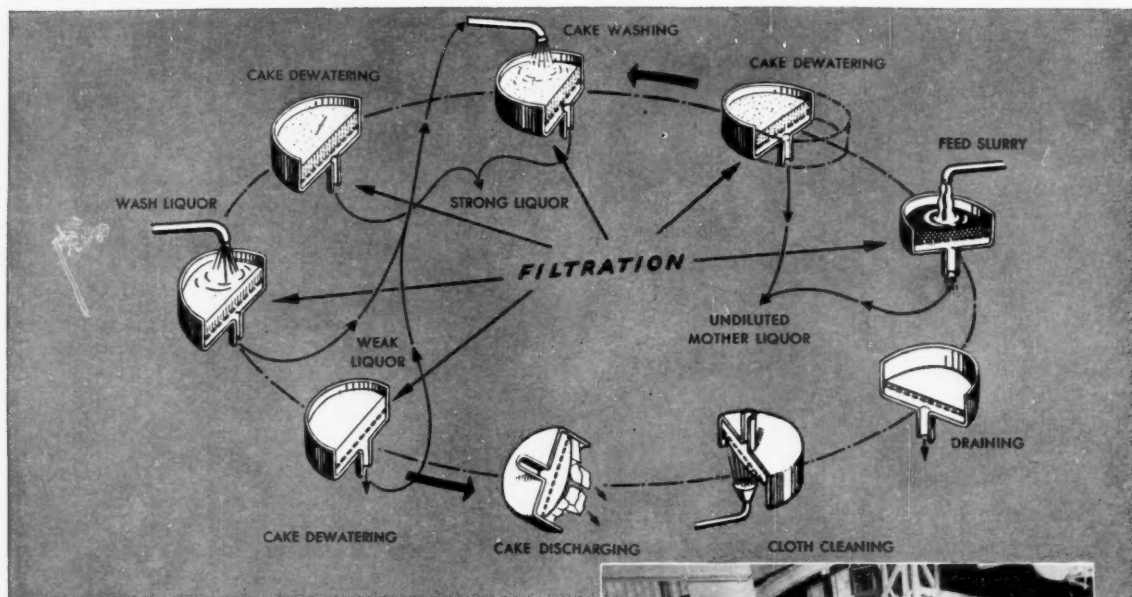
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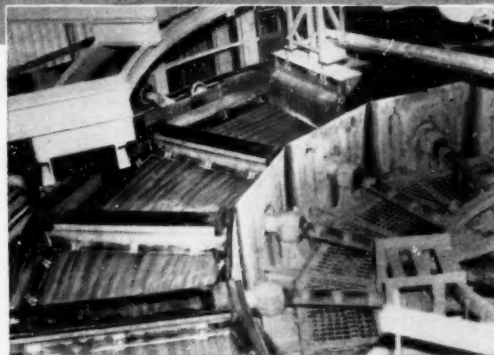


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Effective Counter-Current Wash with the Least Amount of Wash Liquor. With the Bird-Prayon, solubles in the cake get down to an irreducible minimum using a fraction of the wash water required by other filters. Complete cake discharge and thorough washing and drying of the filter media every time around prevents contamination or dilution of the incoming feed.

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Washington Newsletter

CHEMICAL WEEK

June 14, 1958

Chemical tank-car explosions will get close government scrutiny.

Interstate Commerce Commission will probe two recent railroad tank-car explosions (*also see p. 30*) involving nitromethane shipped by Commercial Solvents Corp. Both occurred at switching points—one at Niagara Falls last Jan. 22 and the other, which resulted in two deaths, at Mt. Pulaski, Ill., June 1. The latter has led Commercial Solvents to suspend all tank-car and tank-truck shipments of nitromethane; railroads, too, have slapped a nationwide embargo on tank-car shipments of the chemical.

Stiffer requirements to prevent contamination may be the upshot of the investigation, if the current theory on the cause of the explosions stands up. Company officials claim that laboratory tests show nitromethane will not explode on impact; nor will it flash at below 80 F. When ignited by external flame, the chemical burns slowly and evenly but doesn't explode—at least, not in the lab. So, ICC experts speculate that the tank cars became contaminated, resulting in the formation of an explosive mixture. The Illinois Central Railroad, carrier involved in the Mt. Pulaski explosion, says the tank car was thoroughly cleaned before being loaded with the nitromethane.

Bipartisan plan to set up permanent science and technology

committees in the House and Senate is on tap. The committees would take over the Senate's new outer-space group and possibly the 12-year-old Congressional Joint Atomic Energy Committee, as well. When staffed and organized next year, the new groups will consider proposals to set up a Cabinet department on science and technology.

The tax liability of Du Pont stockholders under the government's GM-Du Pont splitup is the subject of proposed legislation by Delaware's Sen. J. Allen Frear. Frear would revoke the IRS ruling that the value of GM stock distributed to Du Pont stockholders be taxed as ordinary income.

Frear's bill would allow the same tax treatment Congress legislated for involuntary distributions to stockholders in public utility and bank holding companies. Under this kind of law, Du Pont stockholders would pay a tax on the GM stock they receive only when this stock is sold—and the capital gains tax rate would apply. Frear would apply this rule to all stock distributions arising from antitrust cases.

Du Pont says company stockholders would pay about \$680 million in taxes, under the government's ruling.

Look for a renewed drive for government health insurance

next year. Rep. Aime Forand (D., R.I.) has labor union backing for a bill giving free hospitalization, surgery and home nursing care to anyone drawing social security old-age-and-survivor-benefit checks. American Medical Assn. and three other organized medical groups are gearing to

Washington

Newsletter

(Continued)

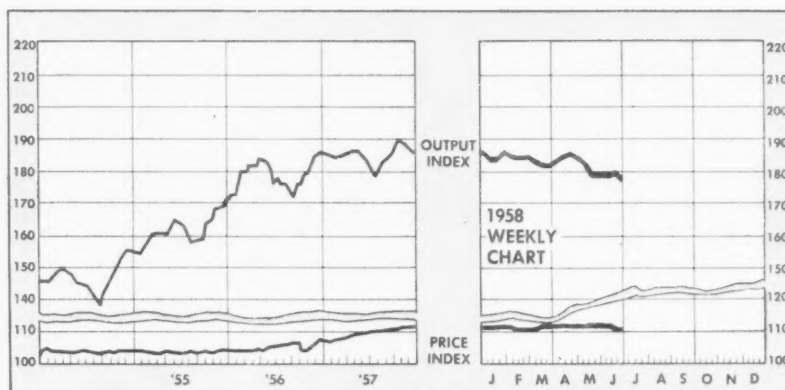
fight the plan, which Forand says he'll push next year.

The drug industry has a stake in this: one of the big medical problems of the aged is the cost of medicines for chronic conditions; proposals to help pay for these drugs are sure to be explored.

Faces, but not policies, are changing at Atomic Energy Commission. John A. McCone, the Los Angeles businessman who moves into AEC replacing Chairman Lewis Strauss, is expected to maintain the Eisenhower partnership concept for development of a civilian atomic program.

One positive gain, however, is probable: better relations between the commission and Congress. McCone, like Strauss, is a Republican. But he, unlike Strauss, has a reputation—indeed, a record—for being able to work harmoniously with Democrats.

Strauss leaves Washington to the tune of warm praise from the White House and hot denunciation from his Congressional critics. Democrats in Congress never quite forgave him for his part in the celebrated Dixon-Yates case, and their strong feelings—plus Strauss's unwillingness to concede a point—hamstrung AEC. McCone goes to the commission with a nomination to be merely a member. Strauss's successor as chairman may be McCone, or another AEC member. The big job for the new chairman, whoever he may be, is restoration of AEC's full effectiveness by being able to work with Congress in an atmosphere of trust.



Business Indicators

WEEKLY

	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	177.0	180.0	182.5
Chemical Week wholesale price index (1947=100)	110.8	110.8	110.0
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	39.61	38.96	44.82

MONTHLY

Trade (million dollars)

	Manufacturers' Sales			Manufacturers' Inventories		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All manufacturing	24,847	24,931	28,679	51,527	52,009	53,663
Chemicals and allied products	1,826	1,745	1,894	3,832	3,877	3,730
Petroleum and coal products	2,559	2,597	3,028	3,458	3,510	3,267



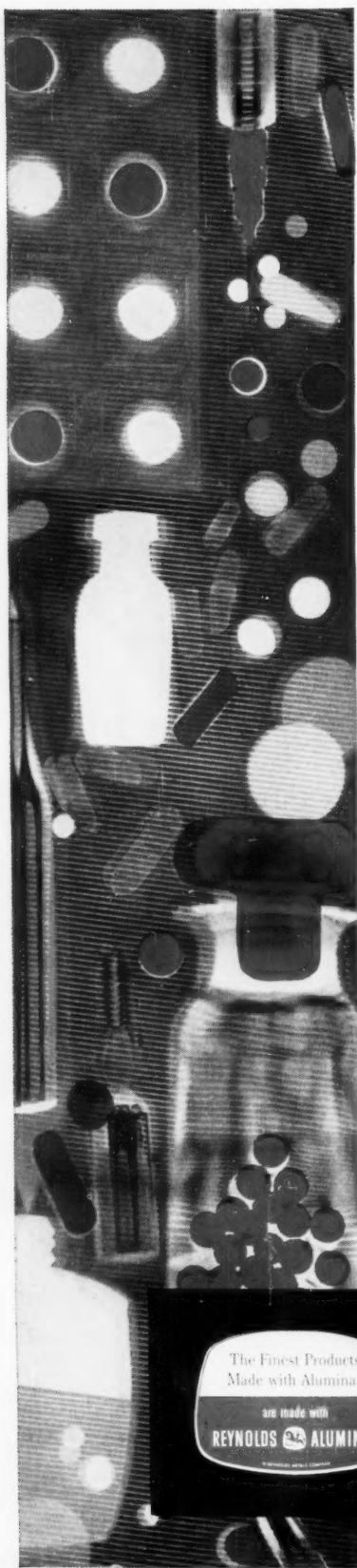
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The properties to look for in HYDRATED ALUMINAS

Not all $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ is the same. Some batches of hydrated alumina will yield disappointing results in final products, and problems in processing. For this reason, you'll be wise to check for certain properties in your hydrated aluminas:

First, hydrated aluminas should have low organic contamination. Snow-white Reynolds hydrates, produced by a combination Bayer-Sinter process, have virtually no organic content—and won't "yellow" a product. This processing also prevents foaming during reaction, and lowers the alkali content of the hydrates.

Reynolds hydrated aluminas don't have the black specks and streaks that some Bayer-type hydrates have, and their iron content is extremely low.

High Solubility, Purity

You should also be sure that your hydrated aluminas have a high reactivity rate, leaving only trace quantities of insolubles when treated with acids or bases. Reynolds hydrates, R-5002 and R-5003, do have these qualities. They are highly soluble, and about as pure as modern processing methods can make them.

In addition to their high solubility, purity and fast reactivity, Reynolds hydrated aluminas offer a wide range of particle sizes. Two basic types are offered: R-5002, which is specially refined for an

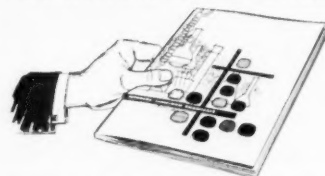
extremely low Fe_2O_3 content, and R-5003, for use where the Fe_2O_3 limitations are not as rigid.

Hydrated Alumina Uses

Hydrated alumina is widely used in the production of petroleum cracking catalysts, as an adsorption agent in ceramics and roofing granules, and in sagger washes and mold coatings.

Since it reacts readily with strong mineral acids and alkalies, hydrated alumina is used in production of salts such as iron-free aluminum sulfate, sodium aluminate, basic aluminum sulfate, aluminum chloride and aluminum phosphate. It is used to make glass and ceramics more resistant to heat, shock, and chemicals, and to add sparkle to glass and glazes.

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CW PHOTO—H. BASKIN

AEC Sifts Process Routes to Low-Cost Fuel Recovery

The Atomic Energy Commission this week is making new efforts to unplug the bottlenecks that have kept private industry from nuclear fuel reprocessing—problems of high cost and process complexity. And from latest reports—compiled for AEC by Argonne National Laboratory from published and unpublished literature—it appears that modified, time-proved aqueous processes still hold an edge on less-familiar but technically promising uranium-separation systems.

AEC's goal is the development of economical chemical-processing and waste-disposal methods that are applicable to all types of fuels used, or proposed for use, in military and civilian power reactors. Its three most promising approaches:

- Aqueous processing starting with several fuel-dissolving procedures by which various types of fuel can be treated for subsequent separation in a common extraction system.
- Volatility processing that yields recoverable fuel (uranium or plutonium) directly in the desired hexafluoride.
- Integrated, low-decontamination processing systems for use with specialized types of reactors.

Aqueous Routes: Because they're relatively simple, and are conventionally used for recovery of uranium from ore, aqueous processing methods are expected to dominate the nuclear fuel recovery field for at least the next several years (*CW*, March 29, p. 49). And as it is in the processing of "cold" scrap, solvent extraction is the

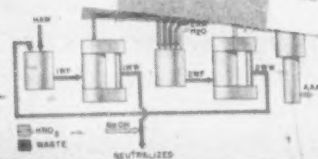
most widely used aqueous technique currently employed for the recovery of "hot" irradiated scrap.

The two processes that make up the bulk of "hot" solvent-extraction operations are Purex and Redox processes. Though they employ different organic solvents (Purex uses tributyl phosphate; Redox uses hexone or methyl isobutyl ketone), both recover uranium and plutonium by similar six-step methods:

- (1) Extraction of uranium and plutonium nitrates from aqueous solutions by dilute organic solvent.
- (2) Partitioning of the uranium and plutonium.
- (3) Decontamination and recovery of uranium.
- (4) Decontamination and recovery of plutonium.
- (5) Solvent recovery.
- (6) Nitric acid recovery (including waste concentration).

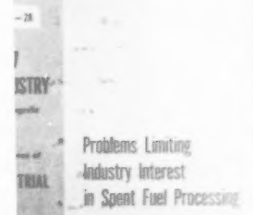
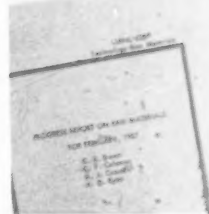
Among the important modifications of solvent-extraction processes now under investigation are changes to permit recovery of neptunium, substitution of trialkylamines for relatively less radiation-resistant tributyl phosphate (TBP). Since radiation damage contributes to significant loss of costly solvents (radiolysis breaks pure TBP down into dibutyl phosphate, butyl alcohol, monobutyl phosphate, butyl ether, phosphoric acid, hydrocarbons and polymers), AEC is also studying the efficacy of various hydrocarbon diluents for minimizing such damage.

To accommodate such new fuels as the Army Packaged Power Re-



PROGRESS
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ATOMIC ENERGY

THE PUREX PROCESS -
A SOLVENT EXTRACTION REPROCESSING
METHOD FOR IRRADIATED URANIUM
B. ROSS & M. H. S. A.
ATTC 6, 1957



OF No. 57-AF-15

The 1957
YEAR-END INDUSTRY
REPORT

Commentary
Fuel Preparation
Reprocessing

Atomic Industrial Forum, Inc.

Reprocessing

39



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ENGINEERING

actor's stainless steel-clad stainless steel-U²³⁵ alloy and Atomic Power Development Associates' Zircaloy-2-clad uranium-molybdenum alloy, work is continuing on new starting (head-end) processes capable of converting fuels resistant to nitric acid (the generally used solvent) into a solvent-extractable nitrate form. Most-promising head-end processes: Darex, which uses mixed nitric-hydrochloric acid to dissolve stainless steel; Zircex, which involves anhydrous chlorination of the fuel, separation of zirconium as a volatile product. The recovered fuels must be further processed into reusable form.

Fluoride Volatility: Fluoride volatility processes, on the other hand, not only yield reusable fuel in the convenient hexafluoride form, but permit the use of two selective purification operations — fractional distillation and absorption-desorption. In general, the volatility processes are of two types: a low-temperature (to 130 C) method of treating relatively pure, natural or slightly enriched uranium; high-temperature (600-800 C) dissolution of alloyed, enriched uranium in a fused fluoride salt.

Of interest among the low-temperature methods is a continuous dissolution of uranium in bromine trifluoride, piloted at Brookhaven National Laboratory. This process yields uranium directly as the hexafluoride, which can be purified and decontaminated by fractional distillation. Because it shows promise of high throughput capacity in relatively small equipment with a very low volume of radioactive waste, this continuous process is considered to have a fair chance of achieving economic success.

The fused-fluoride process has been piloted both at Argonne and at Oak Ridge National Laboratory, is considered promising for recovering enriched uranium from zirconium-uranium alloys. Essentially, this method consists of first dissolving the alloy in a molten sodium fluoride-zirconium fluoride mixture with a hydrogen fluoride vapor sparge at 600 C., then fluorinating the resulting uranium tetrafluoride to uranium hexafluoride. Volatilized hexafluoride may be finally decontaminated either by fractional distillation or by adsorption-desorption using sodium fluoride,



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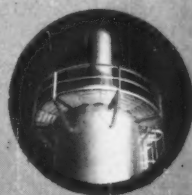
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ENGINEERING

for example, as the solid absorbent.

Integrated Processing: Pyrometallurgical processes are favorably regarded for on-site recovery of nuclear fuels, are presently planned for three power reactor plants. Atomics International Division of North American Aviation, Inc., contractor on AEC's Sodium Reactor Experiment (SRE), is working on a package reprocessing plant (*CW, May 10, p. 31*); ANL is designing a pyrometallurgical system for use with the EBR-II fast-breeder reactor. The Liquid Metal Fuel Reactor (LMFR) is the third candidate for this type of reprocessing facility.

Simplest of the pyrometallurgical

processes is the melt-refining technique (oxide drossing). This involves melting the decanned fuel in a zirconium-oxide (or magnesium-oxide) crucible and holding the material at 1300-1400 C for three to five hours. Volatile fission products, such as xenon, krypton and cesium, are boiled off; reactive, nonvolatile fission products are removed in a reaction layer that forms on the wall of the zirconium oxide crucible.

AEC also has under development two pyrometallurgical processes—Hermex and Pyrozinc—in which uranium is dissolved in a metal solvent, recovered by subsequent fractional crystallization of an intermetallic com-



'Making' Steel in a Computer

At Jones & Laughlin's research laboratory (Pittsburgh), supervisor Nick Simcic (*left, above*) and research engineer J. C. Buker simulate steelmaking processes on J&L's new analog computer. After it has been programmed to duplicate actual production data, the computer plots the effects

of varying operating conditions—without the financial risk of trying them in a pilot-plant or commercial steelmaking unit. Initially, J&L is using the analog for improvement of process control, analysis of automatic control systems and information-handling methods.

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New polyethers available in commercial quantities

The commercial availability of a host of new urethane polymer intermediates gives you an opportunity to pick the right combination of molecular weight and functionality. The choice of product properties offered by diol polyethers and triol polyethers permits new and improved formulations for flexible foams, semi-rigid and rigid foams, elastomers, coatings, and adhesives.

SPECIAL RESIN GRADE DIOLS

Polypropylene glycols are widely used as major components in polyether systems. Three new grades are available in tank car quantities:

Product	Molecular Weight	Hydroxyl Number*
NIAX Diol PPG-2025.....	2025.....	56
NIAX Diol PPG-1025.....	1025.....	110
NIAX Diol PPG-425.....	425.....	265

The range of molecular weight permits a wide variation in polymer properties. NIAX Diol PPG-2025 is incorporated in cushioning products. NIAX Diol PPG-1025 and NIAX Diol PPG-425 are of value in semi-rigid foams, coatings, and elastomers.

6 TRIOLS IN NEW SERIES

A new series of NIAX polyurethane intermediates are the propylene oxide adducts of trifunctional polyols—

Product	Hydroxyl Number*	Molecular Weight
NIAX Triol LHT-42.....	42.....	4,000
NIAX Triol LG-56.....	56.....	3,000
NIAX Triol LHT-67.....	67.....	2,500
NIAX Triol LHT-112.....	112.....	1,500
NIAX Triol LG-168.....	168.....	1,000
NIAX Triol LHT-240.....	240.....	700

Polyethers with three reactive hydroxyl groups are used to obtain highly cross-linked urethane polymers. In general, as the hydroxyl number of NIAX Triol increases, so does the load-bearing properties of the final foam. NIAX Triol LHT-42 gives a very soft flexible foam, while NIAX Triol LHT-240 is useful in formulating semi-rigid crash pads.

Flexible foams made with NIAX Triol LHT-67, NIAX Triol LG-56, and NIAX Triol LHT-112 show improved compression set characteristics over similar foams based on diols cross-linked with low molecular weight trifunctional or tetrafunctional simple polyols. NIAX Triol LHT-112 and NIAX Triol LG-168 with NIAX Diol PPG-2025 in flexible foam formulations give improved compression-deflection properties with minimum loss in tensile strength or resiliency.



A new field of polymer chemistry has developed through study of the reaction of the isocyanate group with compounds containing active hydrogen atoms. Development of new low-cost polyethers is speeding the commercial use of urethane polymers—from soft resilient foams pictured here to semi-rigid crash pads and tough abrasion resistant elastomers and coatings. The CARBIDE polyethers—through the hydroxyl group—react with aromatic diisocyanates in the presence of amine catalysts to form the stable urethane structure.

Thus, foam properties can be varied over a wide range by use of the NIAX Triols alone or in combination with NIAX Diols.

MIXED OXIDE DIOLS

In addition to the straight polyoxypropylene ethers, copolymers of ethylene oxide and propylene oxide are now avail-

able for evaluation. Polyethers containing 10, 25, and 50 per cent polyoxyethylene linkages suggest numerous applications where good low temperature properties and reduced oil solubility are needed. The copolymers containing higher amounts—25 and 50 per cent—of ethylene oxide are suggested for trial in sponges and other products where water absorption is needed.

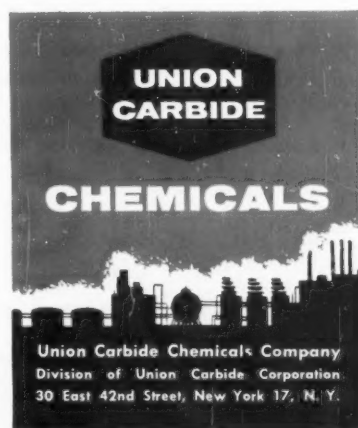
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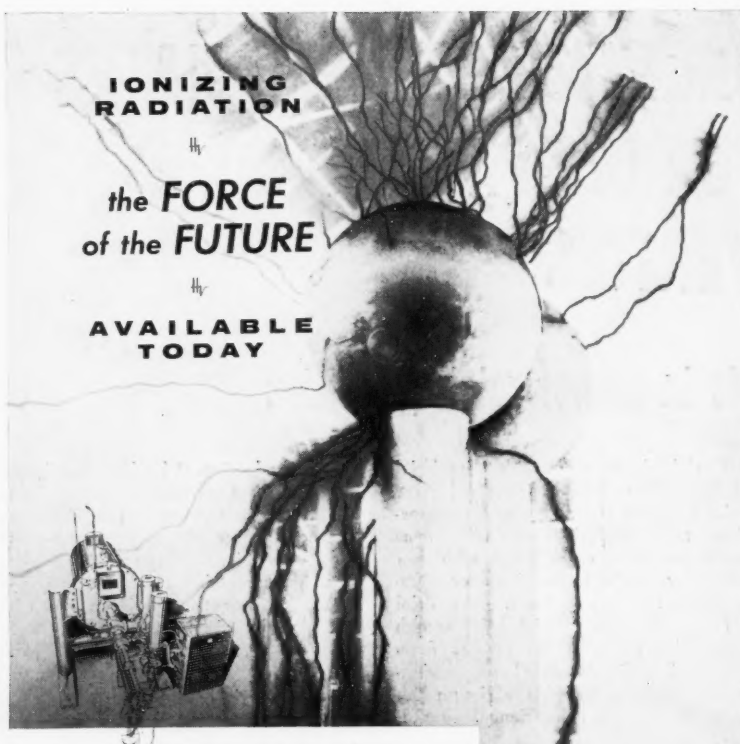
All of the NIAX polyethers are produced to rigid specifications that assure you of uniform quality of the prepolymers and final product. Specifications for NIAX intermediates are available from your CARBIDE Technical Representative—or write . . . Department H, Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, New York.

In Canada, Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.

*Hydroxyl number is defined as the number of milligrams of KOH equivalent to the hydroxyl content of one gram of NIAX polyether sample.

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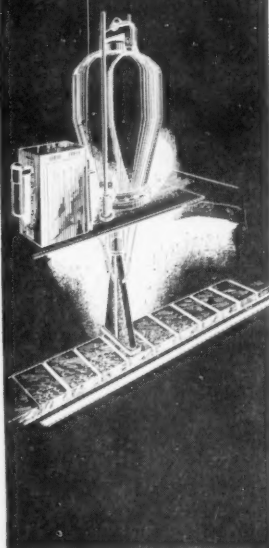
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ENGINEERING

pound and vaporization of the solvent metal.

The Hermex process being developed at Oak Ridge employs mercury to dissolve uranium at 356 C. Impurities are removed by filtering and washing the resulting amalgam, and recrystallizing the uranium or its mercuride. Finally, the mercury is vaporized off in a vacuum retort; uranium is consolidated by melting or sintering. Advantages claimed for the Hermex process: it combines the low-temperature and continuous-operation features of solvent extraction with the radiation-resistant media and metallic-state operation of pyrometallurgy.

The Pyrozinc process developed at Argonne operates in a similar manner using molten zinc as a solvent, with uranium crystallizing as a uranium-zinc intermetallic compound.

Homogeneous System: Another type of system ideally suited to an integrated reprocessing plant is the homogeneous reactor. An advantage of using homogeneous aqueous fuel is the fact that fission-product contamination can be held at a low level by continuously or periodically reprocessing a small sidestream of fuel.

At present, two methods are being considered for the fuel recovery in an integral reprocessing facility at the Oak Ridge Homogeneous Reactor Test (HRT). The one receiving the greater study involves separation of solids from the supernatant core fluid, followed by peroxide precipitation of uranium, dissolution and reconstitution into fuel. In the other method, the underflow of core fluid from hydroclone separators is combined with thorium-oxide-blanket slurry and evaporated for recovery of heavy water. The solids are then dissolved in nitric acid and separated by solvent extraction.

Future Market: The chemical operations employed in these processes and in numerous other highly specialized reprocessing schemes are as varied and complex as the reactor systems and fuels for which they're designed. And even if the budding nuclear power industry finally concentrates on only a few of the proposed systems, its inevitable growth is sure to present the CPI with an ever-expanding market for reprocessing reagents and chemical engineering services and equipment.



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Our new Bulletin No. 4351 tells how you can cut both initial and operating costs with Valveless Fil-

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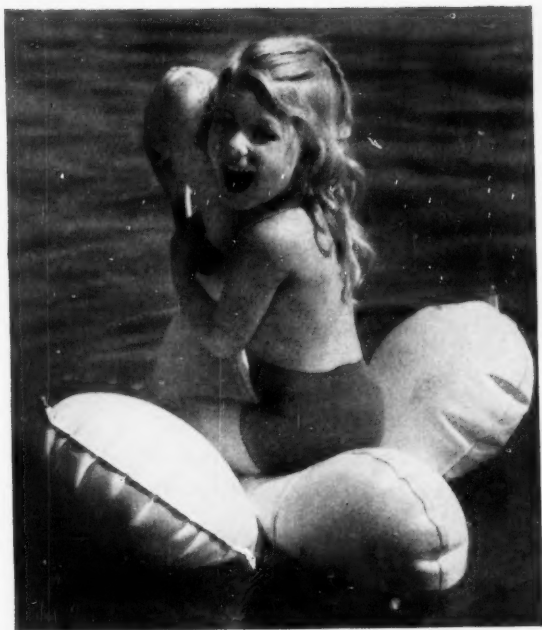
Life on the Chemical Newsfront



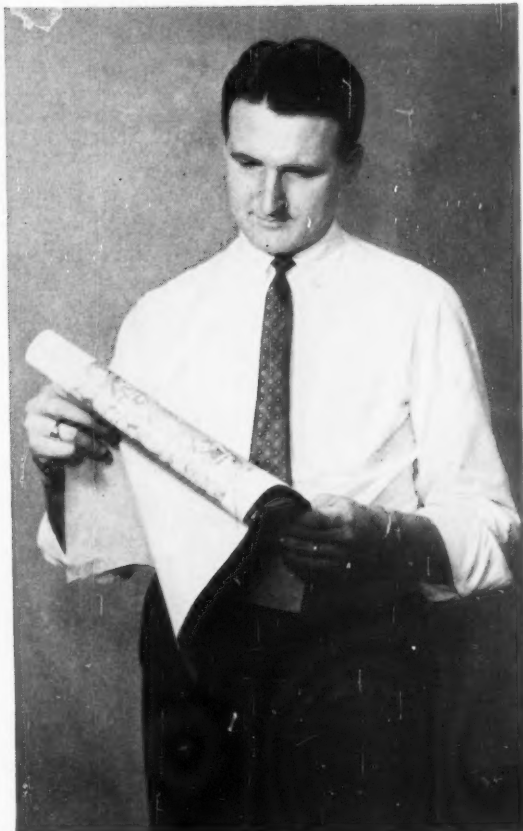
HIGHER WET STRENGTH IN PAPER can be secured with 30% to 60% less resin with Cyanamid's new HE (high efficiency) Process.[†] Intensive field tests have proved that the new HE Process not only provides unprecedented reductions in resin costs, it also makes possible the production of "super" wet strength papers with properties never before obtainable. Details of this process and its licensing can be secured through your Cyanamid Paper Chemicals Department Representative. (Industrial Chemicals Div.)

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the convenient preparation of anhydrous lithium alcoholate which is useful as an alcoholysis catalyst.

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N_H of lithium hydride is 5.90 compared to 6.68 for water at room temperature. And because of its low dissociation pressure at its melting point (27 mm at 680°C.), lithium hydride can be heated to red heat in a thin-wall container... without requiring a pressure shell. It appears to be stable indefinitely at this temperature.

These and many other useful characteristics of lithium hydride may help improve your product or process. For complete technical data, write for Bulletin 102. Address request to Technical Literature Dept., Foote Mineral Co., 420 Eighteen West Cheltenham Bldg., Phila., 44, Pa.

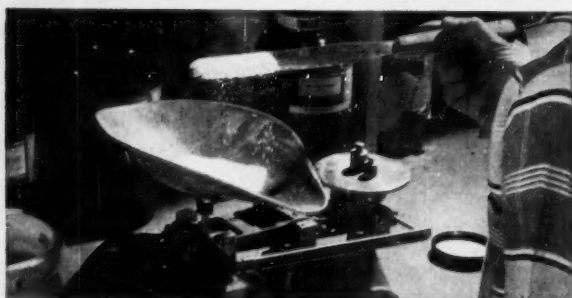


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RESEARCH

NEW MATERIALS



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Thorium Zirconate

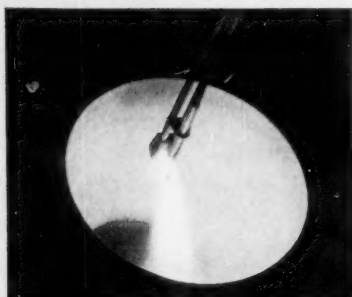
Boron Nitride

Lithium Fluoride

Thorium Oxide

Lithium Borosilicate

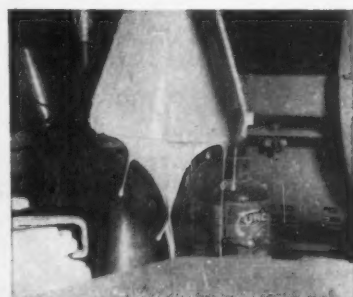
NEW METHODS OF APPLICATION



Flame Spray

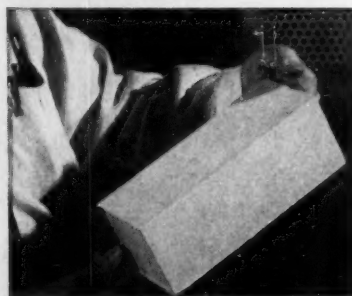


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NEW USES



Battery Cases



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Hotter Prospects for Ceramic Coatings

At the recent Southwestern Metals Exposition in Dallas, Tex., Bettinger Corp.'s (Waltham, Mass.) Nathaniel Cannistraro confidently predicted ceramics research may soon be whittling away much of the \$6-billion annual loss attributed to corrosion.

Protecting the industrial items such as those above already adds up to a big market for ceramics. Longer-lived consumer items such as auto

mufflers and hot-water heaters are also in the offing—thanks to improved ceramic coatings. And the armed forces are looking to refractory coating also, to provide missile and rocket coatings that are resistant to heat as well as corrosion.

That's why ceramic coatings are getting high-priority attention not only from Bettinger (which has developed a series called Becote that are used on

heat exchangers, automobile valves, aircraft engines, exhaust pipes, etc.) but also from such firms as Gulton Industries (Metuchen, N.J.), Norton Co. (Worcester, Mass.), Ferro Corp. (Cleveland), Solar Aircraft Co. (San Diego), Bulwark Corp. (El Monte, Calif.), and the Linde Air Products Co. (New York) and Electro Metallurgical Co. (Niagara Falls, N.Y.) divisions of Union Carbide. In general,

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RESEARCH

these companies are looking for coatings that are inexpensive, easily applied; heat-, corrosion- and abrasion-resistant; able to withstand thermal shock; and which form a chemical bond with the base material. All report progress—as well as a considerable number of problems still to be solved.

Changing Times: Their approaches vary widely in the areas of coating materials and methods of application, but all researching firms have a common incentive: the constantly changing customer requirements. These changes, in turn, affect coating chemistry. Norton, for example, seeks coatings that will stand up to 3300-5000 F for missiles and rockets and will also have good wear, anticorrosion and electrical insulation properties. Item: Norton's present aluminum oxide coating will withstand 3600 F.

Industrial coaters are trying to find

the "all around" protection of metals in the 1000-2000 F range. Gulton has been researching in this range, claims its coating will protect aluminum to 1300 F, low carbon steel to 1600 F, and stainless steel to 1900 F. It has experimentally coated kitchen ovens, hoping to lessen the need for insulating material. Gulton is also working on a coating for engine parts.

Bulwark Corp. uses a coating similar to Gulton's, adds materials to its mixture (usually magnesium carbonate and sodium nitrite) to control the fluid properties of the coating. Bulwark reports its coating has outstanding electrical insulation properties in the 500-800 F range. Consolidated Electrodynamics Corp. (Pasadena) has a new Ceramicite coating for wire, useful up to 1000 F.

Ferro Corp., a leading frit manufacturer, seeks to eliminate the blister-



Strain-Free Sapphires for Optics

Synthetic sapphires made in this high-temperature reactor at Bell Telephone Laboratories are reportedly superior for optical purposes to those made by other processes, because of their freedom from strain. Sapphire crystals, which transmit light from infrared into ultraviolet regions, are used in lenses, prisms, etc., for special lab equipment. Shown (right to left)

are Bell's R. A. Laudise, A. A. Ballman and A. J. Caporaso, who have grown sapphires up to $\frac{3}{4}$ in. square, $\frac{1}{4}$ in. thick, using the new technique. Their system is to dissolve aluminum oxide in water, then recrystallize the oxide under conditions that involve pressures of 20,000-50,000 psi. and temperatures of about 395 C and higher.



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RESEARCH

ing that sometimes occurs when frit reacts with the base metal. It is also researching ways of adding colors to frit.

Application to the Problem: Just as diverse as these problems are the routes to their solutions. But the research centers around three major ways to apply the coatings: dip-coating, slurry spray and flame spray. Each firm stresses the type of coating particularly suited to application systems it believes best.

- Dip-coating, perhaps the oldest method, is used in applying porcelain to metals. And now Solar Aircraft is broadening the potential of dip-coating, has been researching it as a way to apply cermets (metallic powder combined with a bonding agent and ceramic refractory materials).

- In slurry-spraying, the coating ingredients (in water or organic medium) are sprayed onto the surface to be coated; the coated material is then oven-cured.

- Flame-spray ceramics, usually in rod form, are fed into an oxyacetylene flame, then deposited on the metal surface to be coated. Among the compounds used for this purpose are aluminum oxide, zirconium silicate, silicon carbide and chromium oxide.

Dealer's Choice: Gulton, favoring slurry-spraying, is researching a surface-layer deposition type of coating that has three components: (1) a low-melting glass (which may be a commercially available glass or a prepared "frit" composed of high-lithia-bearing materials and powdered quartz); (2) superrefractory materials offering high-temperature resistance—e.g., boron carbide, hafnium nitride or barium zirconate; (3) fluxing agents. The latter materials lower the curing temperature, allow coating of such low-melting-point metals as aluminum and low-carbon steel. Lithium fluoride, lithium chromate or lithium borosilicate are typical fluxing agents.

Paul Huppert, director of Gulton's ceramic coatings research, likes slurry-spray coatings because they afford high-temperature resistance and good bonding. He theorizes that a chemical bond is formed when the oxide of the metal surface goes into semisolution with the coating (an interface layer being formed between the two). Superrefractory ceramics that are used enhance the heat resistance

of the coating, but they also require higher curing temperatures.

Because the corrosion resistance of slurry-spray coatings is often poor, Huppert suggests a second coating—tailored to extend superior corrosion resistance.

A modification of slurry-spray coating, patented by Armour Research Foundation (*CW*, Sept. 11, '54, p. 52), differs from Gulton's approach in that the coating slurry is sprayed onto a preheated surface (200-700 F).

Flame-Spray Fan: Linde claims excellent abrasion resistance for its aluminum oxide and tungsten carbide flame-spray coatings. Linde reports "the carbide coating may be placed on metals without raising the surface temperature above 400 F, allowing for preheat treating of the base metal, which will not be 'undone' by the furnace cure required in the slurry- or dip-spray methods." These coatings can be highly polished, have found use in bearings, machine and engine parts.

Coating Competition: Not to be outdone in their own field, metallurgists are hot on the trail of new high-temperature-resistant metallic alloys, hoping to reduce the need for coatings to a minimum. Charles Brown and Richard Fountain, of Electro Metallurgical Co., last month reported through American Institute of Mining, Metallurgical and Petroleum Engineers Inc. that new alloys based on titanium, molybdenum, columbium or tungsten are being researched, will probably lead to metals with useful strength up to 3400 F.

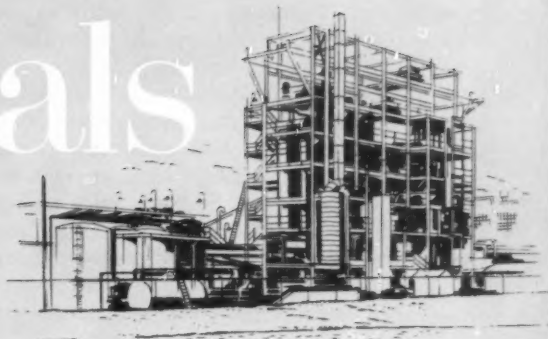
Clarence Lorig, of the Battelle Memorial Institute (Columbus, O.), and other metallurgists see the boundary between metals and ceramics fading in the next 25 years. They foresee further development of cermets, which combine the best features of both.

Lorig predicts that the development of materials with improved ductility and elevated temperature strength "will be based largely on better theoretical understanding of the solid state rather than the trial-and-error approach by which present high-temperature (ceramic and metal alloy) materials are developed." Meanwhile, ceramic researchers are using big helpings of both theory and the empirical approach to come up with better coatings. Their chances for success never looked brighter.

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ACRYLIC ESTERS—A wide range of monomeric acrylate and methacrylate esters is available, providing a series of monomers whose polymers vary from very soft, rubber-like, film-forming materials to hard, transparent plastics. These esters may be polymerized by a variety of processes—bulk, suspension, solvent, and emulsion. They copolymerize readily with a large number of other monomers, permitting considerable modification in the physical properties of the resulting copolymers. *Typical uses:* Polymers and copolymers of monomeric acrylic esters are useful as thermoplastic sheets and molding powders, solvent coatings, binders for explosives, heat-resistant elastomers, adhesives, water-soluble thickeners, and emulsions for the textile, leather, paper, and paint fields. They are also used as intermediates for pharmaceuticals, photographic chemicals, and detergents.

ACRYLIC ACIDS—Both glacial acrylic and glacial methacrylic acid are available. These water-soluble acids may be polymerized to water-soluble polymers, or they may be copolymerized with other monomers to obtain polymers having varying degrees of solubility in alkali or water.

Typical uses: The use of small quantities of these acrylic acids in copolymers can: 1) provide a product which can be vulcanized with metallic oxides without use of sulfur, or can be cross-linked with diepoxides, diamines, glycols, etc., 2) increase the mechanical stability of emulsions, 3) improve adhesion, 4) increase resistance to attack by oils. Amphoteric copolymers may be produced by copolymerization with basic monomers such as dimethylaminoethyl methacrylate. The acids also serve as intermediates for the production of special esters such as glycol diacrylate and dimethacrylates.

OTHER MONOMERS—*Methacrylamide* is a water-soluble monomer, which can be polymerized to a water-soluble polyamide, or copolymerized to give a reactive group for cross-linking purposes. *Dimethylaminoethyl methacrylate* is another water-soluble monomer, which can be polymerized to a water-soluble cationic polymer, copolymerized with "neutral" monomers such as acrylonitrile to introduce a basic group, or with an acidic monomer such as methacrylic acid to give a polyampholyte.

THE FOLLOWING ACRYLIC MONOMERS ARE AVAILABLE:

Commercial Quantities : Methyl acrylate • Ethyl acrylate • Butyl acrylate • 2-Ethylhexyl acrylate • Methyl methacrylate • Ethyl methacrylate • Butyl methacrylate • Hexyl methacrylate • Decyl-octyl methacrylate • Lauryl methacrylate • Stearyl methacrylate • Glacial methacrylic acid • Glacial acrylic acid
Pilot Plant Quantities : Calcium acrylate • Methoxyethyl acrylate • Methacrylamide • Dimethylaminoethyl methacrylate

Methylamines

Rohm & Haas methylamines — monomethylamine, CH_3NH_2 ; dimethylamine, $(\text{CH}_3)_2\text{NH}$; and trimethylamine, $(\text{CH}_3)_3\text{N}$ — are very low-cost sources of basic organic nitrogen. All three amines are available in either aqueous or anhydrous form. *Typical uses:* The dimethyldithiocarbamates and tetramethylthiuram sulfides have shown usefulness as agricultural fungicides, accelerators for rubber vulcanization, and animal and insect repellents. Unsymmetrical dimethylhydrazine, a component of rocket propellants, is derived from dimethylamine. Surface active agents are available by several synthetic routes starting with monomethylamine. Monomethylamine also is used in the preparation of p-methylaminophenol, the sodium salt of which is utilized in photo-

graphic developers. 1,3-Dimethylurea, produced from monomethylamine, is an intermediate in the synthesis of theophylline and caffeine. Monomethylamine is a raw material for a number of sympathomimetic drugs (e.g., N-methylphenethylamine or N-methylphenylpropylamine derivatives) and analgesics not related to or derived from morphine. Dimethylaminoethanol, an intermediate for local anesthetics and antihistamines, is prepared from dimethylamine. The preparation of choline chloride, widely used poultry feed additive, employs trimethylamine. Other uses for the methylamines include the production of high molecular weight quaternary ammonium salts, acidic-gas absorbents, and explosives. Commercially available.

Priminox[®] polyethoxy amines

These amines have the general formula:



where n is the number of ethoxy groups and $\text{R} + \text{R}' + \text{R}''$ represents a total of 17 to 20 carbons. They are obtained by reaction of Primene JM-T with ethylene oxide. Priminox 43, a liquid at room temperature, has one ethoxy group. It is soluble in aromatic hydrocarbons and common

organic solvents. Priminox 10, also a liquid at room temperature, has 5 ethoxy groups. It is slightly soluble in oil and water. Priminox 21 has 15 ethoxy groups, is a paste at normal temperatures, and is soluble in water and aqueous acids. Priminox 32 has 25 ethoxy groups, is a solid at normal temperatures, and is soluble in water and aqueous acids. The Priminox amines effectively reduce surface and interfacial tension over a wide pH range, and are useful in low-foaming, efficient detergents. They are also suggested for use as bactericides, corrosion inhibitors, and fuel oil additives. Commercially available.

Alkylphenols

Octylphenol, a light-colored, flaked solid and nonylphenol, a pale amber liquid, have these formulas:



Octylphenol



Nonylphenol

Both alkylphenols are insoluble in water, but soluble in many common organic solvents. They undergo most of the reactions common to phenols; namely, nuclear substitution, esterification, etherification, and salt formation. *Typical uses:* Reaction with alkylene oxides yields non-ionic surface active agents, the solubility of which vary with the number of alkoxy groups. The alkyl-

phenols may be reacted with aldehydes to produce phenolic resins; used in small quantities with other phenols in the preparation of phenolic resins, the alkylphenols serve to improve water resistance, oil solubility, and electrical properties. They also act as internal plasticizers. The reaction of alkylphenols with formaldehyde or with sulfur halides yields intermediates for lubricating oil anti-oxidants and detergents. Other products available through octyl- and nonylphenol include vinyl resin stabilizers, fungicides, germicides, rubber chemicals, pharmaceuticals, adhesives, and corrosion inhibitors. Octylphenol, in addition, stabilizes ethyl cellulose against deterioration by heat and light. Commercially available.

t-Alkyl amines

The five t-alkyl amines offered by Rohm & Haas—Primene® 81-R (12-14 carbons), Primene JM-T (18-21 carbons), t-butylamine, t-octylamine, and t-nonylamine—are free-flowing liquids having the general formula:



where R, R' and R'' are alkyl groups.

Although these amines undergo most of the reactions common to straight-chain primary amines, the t-alkyl amines differ in reactivity from their straight-chain relatives because of the attachment of the amino group to a completely substituted carbon atom in the t-alkyl amines. This molecular arrangement allows amino-hydrogen substitution reactions to form secondary amines but inhibits tertiary amine formation. Examples of such reactions are alkylation, cyanoethylation, and hydroxyethylation.

Other unusual chemical properties of the t-alkyl amines include noteworthy stability to oxidation and the formation of a number of stable deriva-

tives including aldimines ($\text{R}-\text{NH}=\text{CHR}'$), carbodiimides ($\text{R}-\text{N}=\text{C}=\text{N}-\text{R}$), and t-alkylcyanamides ($\text{R}-\text{NH}-\text{CN}$). The corresponding derivatives of normal primary amines are relatively unstable.

Significant t-alkyl amine physical properties which are not found in straight-chain primary amines of corresponding molecular weight are: fluid character and low viscosity over a fairly wide temperature range, improved solubility in petroleum hydrocarbons, and improved color stability.

Typical uses: The higher molecular weight t-alkyl amines, Primene 81-R and Primene JM-T, are useful as stabilizers and sludge inhibitors in fuel oil and other light oils, and may be useful as intermediates for detergents, anti-oxidant and corrosion-inhibiting additives in many varieties of petroleum products. Other suggested applications for the t-alkyl amines as a class include their use as intermediates for bactericides, surface-active agents, rubber chemicals, anti-foaming agents, flotation agents, anti-static agents, fungicides, pharmaceuticals, anti-oxidants, dyestuffs, photographic chemicals, and insecticides. Commercially available.

Dytol® fatty alcohols

The Dytol fatty alcohols are long-chain compounds having the general formula $\text{CH}_3(\text{CH}_2)_n\text{OH}$. Typical alcohol compositions of the various Dytol alcohols are given in the accompanying table.

The Dytol alcohols undergo many of the chemical reactions typical of alcohols. They may be ethoxylated, sulfated, esterified, halogenated, and

dehydrated. They may be oxidized to aldehydes and carboxylic acids. **Typical uses:** The Dytol fatty alcohols can be used as anti-foaming and emulsifying agents. As chemical intermediates, they find application in the making of cosmetic-cream additives, polymerization regulators for rubber and plastics, textile finishing and softening agents, emulsifiers, detergents, and quaternary ammonium compounds. Commercially available.

	DYTOL M-83 (OCTYL)	DYTOL A-24 (LAURYL)	DYTOL B-35 (LAURYL)	DYTOL J-68 (LAURYL)	DYTOL L-79 (LAURYL)	DYTOL E-46 (CETYL-STEARYL)	DYTOL F-11 (CETYL)
% Octyl (C_8)	98.0	none	none	none	none	none	none
% Decyl (C_{10})	2.0	1.5	1.5	1.0	none	none	none
% Lauryl (C_{12})	none	71.0	60.0	82.0	98.0	none	none
% Myristyl (C_{14})	none	27.0	25.0	17.0	2.0	1.2	1.0
% Cetyl (C_{16})	none	0.5	13.0	none	none	34.0	96.0
% Stearyl (C_{18})	none	none	0.5	none	none	64.8	3.0

Triton[®] surface-active agents . . . the nonionic octylphenoxyethanol series

A series of surface-active agents, reaction products of ethylene oxide with octylphenol, are available. They have the following general formula:



and may be arranged in order of increasing number of ethoxy groups:

Name	n	Name	n
Triton X-15	1	Triton X-102	12-13
Triton X-35	3	Triton X-165	16
Triton X-45	5	Triton X-205	20
Triton X-114	7-8	Triton X-305	30
Triton X-100	9-10		

The solubility in water of these surface-active agents varies from relative insolubility (Triton X-15 through Triton X-45) to excellent solubility (higher members) over a wide temperature range in hard water and brine. The products designated Triton X-15 through Triton X-102

are somewhat viscous, light-colored, 100 percent active liquids. Triton X-165, Triton X-205, and Triton X-305 are supplied as 70 percent aqueous solutions in order to facilitate handling, since the 100 percent materials are waxy solids at room temperature. All of these products are stable in acid and mild alkali and do not interact with cationic or anionic surface-active agents.

The Triton series of surface active agents are useful wherever wetting agents, emulsifiers, detergents, or any other types of depressors of surface tension or interfacial tension are required. Selection of the appropriate agent for any application, naturally, depends upon the characteristics of the system. In general, the diversity of the series should make it possible to select one or more products which will fulfill almost any need for a surface-active agent. Commercially available.

In addition, many other nonionic as well as anionic and cationic surfactants are available under the Triton and Hyamine[®] designations.

Other Rohm & Haas Products:

ACRYLOID[®] oil additives
AMBERLITE[®] ion exchange resins
DITHANE[®] fungicide
PARAPLEX[®] and MONOPLEX[®] plasticizers
PARAPLEX[®] polyester laminating, casting, and molding resins
PLEXIGLAS[®] acrylic plastic sheet and molding powder
RHOPLEX[®] acrylic emulsions for coatings and textile finishes
Coatings resins
Disinfectants and sanitizers
Industrial enzymes
Insecticides
Larvacides and miticides
Leather chemicals
Paper chemicals
Plywood adhesives
Rubber chemicals
Textile chemicals
Thickening agents



ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries



Against rocket backdrop, International Minerals executives are . . .

Slating New Push for Sales

Having used the rocket theme to get its sales service campaign into "full orbit," International Minerals & Chemical Corp. is already scoring the drive as one of the largest, most thorough merchandising jobs ever attempted in the agricultural chemicals field. IMCC's sales secret: teach "do-it-yourself" market methods to local fertilizer mixers.

"Full-Orbit Service," as IMCC calls its new program, is designed to help its customers beat the recession—or whatever problems they may have in the future. The plan encompasses six broad areas:

- Market analysis.
- Sales manpower.
- Dealer meetings.
- Advertising, sales promotion.
- Transportation.
- Technical service.

Trained to Teach: To put the plan into action, IMCC salesmen received a highly intensive three-day training course from the company's top marketing executives. This was done at the outset of the campaign "blast

off," held at Chicago a few days ago. Additional training sessions will continue for the next six months; advanced and refresher courses will continue indefinitely. So far, 30 salesmen, representing the company's Phosphate Minerals, Phosphate Chemicals and Potash divisions, have been schooled in the new plan.

With the special training completed, IMCC's salesmen will work on a person-to-person basis with local fertilizer manufacturers. Part of the sales staffers' job will be to help local producers determine the nature, potential and limits of markets, show them how to train and reward salesmen, suggest how to select advertising media and establish advertising budgets, and how to improve fertilizer manufacturing operations.

Helping the salesmen is a series of "how-to-do-it" manuals, one for each of the six major phases of the program. For example, IMCC's "Know Your Market" booklet gives detailed instructions for conducting local market research. Another brochure,

"Sales Manpower" discusses recruitment, establishment of sales territories, compensation plans, sales training, sales methods, supervision and cost control. Another booklet explores farm chemical promotion. Newspapers, radio, television, direct mail, outdoor advertising, signs, fairs and exhibits and public relations are among the subjects covered. The brochure tells local producers and dealers how to choose the best media and gives numerous suggestions in the preparation, timing, and distribution of material for maximum effect.

Who Needs Service? Is there a need for the type of program IMCC is undertaking? IMCC thinks so. Before launching "Full-Orbit Service," the company conducted an eight-month evaluation program. Marketing division staffers canvassed IMCC's own Fertilizer Manufacturing Division, then tapped all other applicable company sources. This study was followed by a field survey of independent fertilizer manufacturers. Some 100 firms in 130 geographical market areas were queried. The results strongly indicated the need for an intensive customer service campaign.

Further confirmation turned up in field trials. Sales managers tested the "full orbit" idea on a limited number of hand-picked, hard-to-sell customers, found ready acceptance.

Space-Age Theme: To increase the program's impact, IMCC has adopted a space-age theme. Booklet covers, for example, show a whirling planet against a deep blue sky. Marketing Vice-President Tony Cascino believes that a touch of color belongs in industrial selling.

The space-age theme has other purposes, however. One aims at building a clear-cut identity for IMCC.

Another objective of the program, says Cascino, is to make salesmen more effective in solving customer marketing problems. "Salesmen will be lifted from the level of mere order-takers to that of knowledgeable confidants of fertilizer manufacturers."

Clearly, IMCC has staked out an ambitious sales service plan. The months ahead will undoubtedly provide a severe test for the program; selling in the agricultural chemicals market is about as tough as selling ever is.

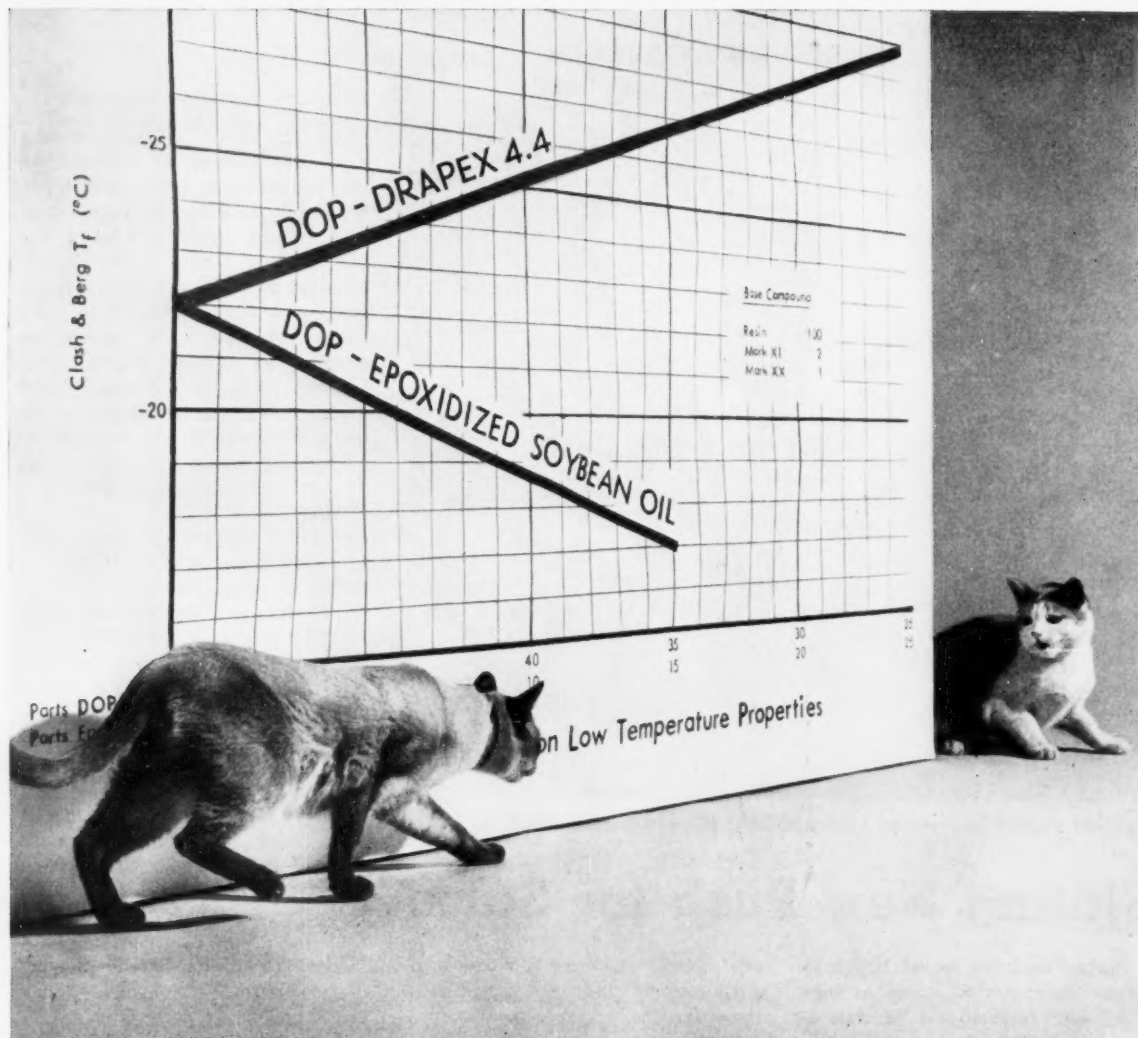


Chart shows comparison between effects of Drapex 4.4 and an epoxidized soybean oil on low temperature properties. Low temperature flexibility is a major advantage of Drapex 4.4.

PURE-BRED EPOXY... AT AN ALLEY-CAT PRICE!

There's a blue-ribbon champion in epoxy plasticizers — Argus' Drapex 4.4! At its new, reduced price, you can replace ordinary epoxy plasticizers with Drapex 4.4 in your vinyl formulations, with the following important advantages:

1. Low temperature flexibility (see chart above).
2. Low volatility.
3. Improved heat and light stability.
4. Low viscosity and viscosity stability in plastisols.

5. Ease of handling (due to low viscosity and low freezing point).

6. Good weatherability.

Argus research has steadily widened the applications of Drapex 4.4 until it now actually costs *less* than other quality epoxies. Moreover, the lower specific gravity of Drapex 4.4 makes it go farther, so that in volume use it costs less than the cheapest competitive epoxy.

For complete information on Drapex 4.4 (and its sister product, Drapex 3.2), write for Technical Bulletin #3.



ARGUS CHEMICAL

CORPORATION

New York and Cleveland

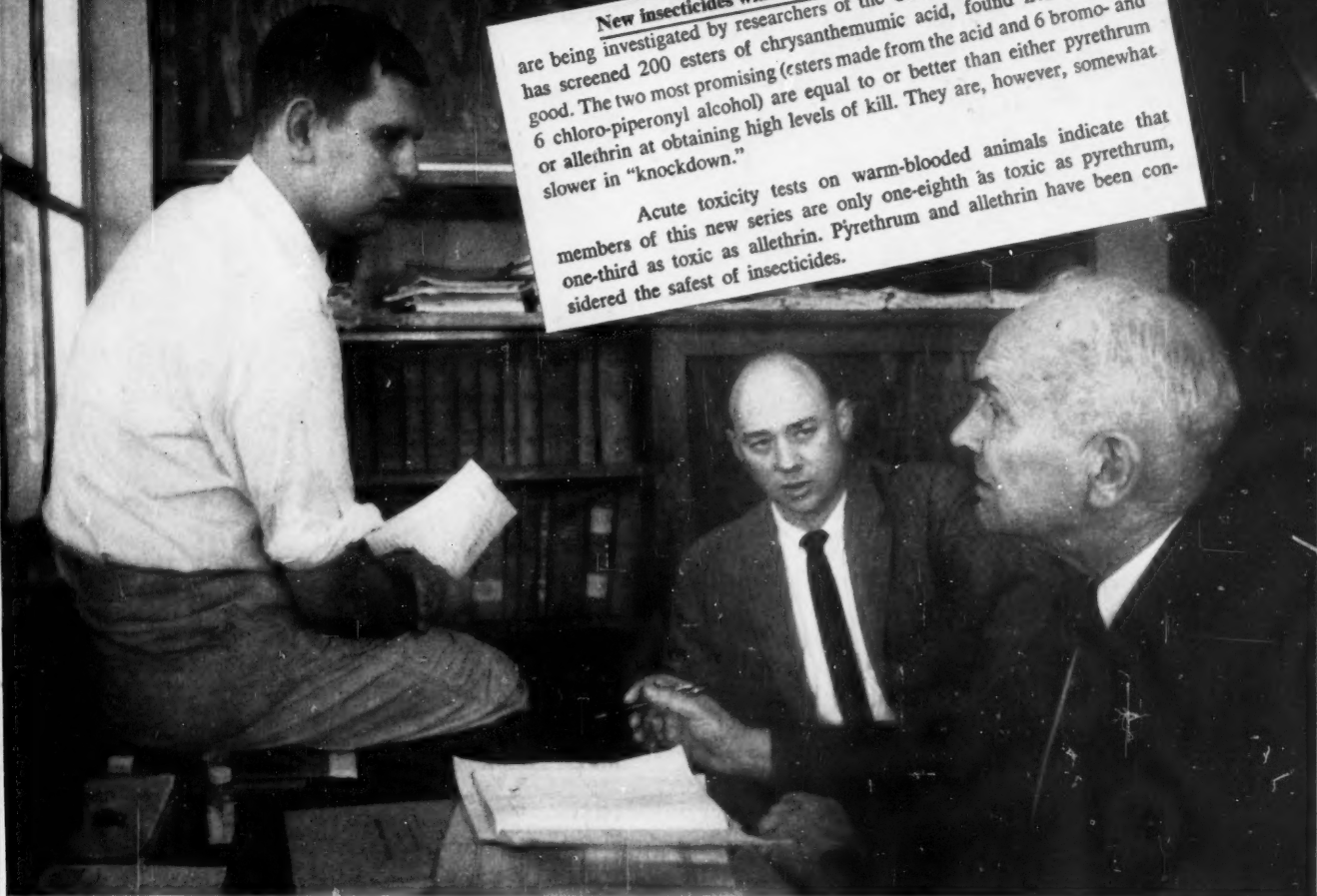
Main Office: 633 Court Street, Brooklyn 31, N. Y. Branch: Frederick Building, Cleveland 15, Ohio

Rep's.: H. M. Royal, Inc., 4814 Loma Vista Ave., Los Angeles; Philipp Bros. Chemicals, Inc., 10 High St., Boston; H. L. Blachford, Ltd., 977 Aqueduct St., Montreal.

SPECIALTIES

New insecticides with low toxicity toward warm-blooded animals are being investigated by researchers of the U.S. Dept. of Agriculture. It has screened 200 esters of chrysanthemumic acid, found five that look good. The two most promising (esters made from the acid and 6 bromo- and 6 chloro-piperonyl alcohol) are equal to or better than either pyrethrum or allethrin at obtaining high levels of kill. They are, however, somewhat slower in "knockdown."

Acute toxicity tests on warm-blooded animals indicate that members of this new series are only one-eighth as toxic as pyrethrum, one-third as toxic as allethrin. Pyrethrum and allethrin have been considered the safest of insecticides.



Alerted to USDA insecticide research by *CW* Newsletter, Benzol's Zimmerli (right) maps manufacturing.

Getting New Insecticide Off to Fast Start

From California to New York, agricultural chemical test stations are this week getting their first look at what may prove to be the "safest" insecticide yet developed. It's said to be "less toxic than table salt."

The new product, revealed by U.S. Dept. of Agriculture last January (*see inset*) and first made by Benzol Products Co. in April, is Barthrin—a chloro ester derivative of chrysanthemumic acid. Sixty pounds of Benzol's Barthrin is now being allocated by USDA to experiment stations, college agriculture departments and county extension agents for painstaking preliminary testing.

Fairfield Chemical Division (Food Machinery and Chemical Corp.) two weeks ago supplied USDA with an additional 75 lbs. Fairfield, one of the nation's two allethrin producers (Benzol is the other), says Barthrin "looks promising . . . doesn't look as good as pyrethrins, allethrin or synergized allethrin."

Even with the best of luck, Barthrin is at least two years from ready-availability to U.S. farmers; consequently, the many phases of the test program pictured here will be augmented by a welter of future tests and experiments.

It Started with *CW*: Stanley Freeman, Benzol's soft-spoken chief chemist, credits *CW* with initiating its work with Barthrin. Freeman noticed a report in *CW* (*Technology Newsletter*, Jan. 11) that USDA had come up with some 200 esters of chrysanthemumic acid, two of which looked extremely promising (the bromo ester made with 6-bromopiperonyl alcohol and the chloro ester made with 6-chloropiperonyl alcohol). Chrysanthemumic acid makes up part of the molecule of pyrethrins and allethrin, widely used household insecticides.

"The chloro ester seemed a natural for Benzol to make," Freeman says. "We've had eight years' experience making allethrin, so we have the manufacturing



Lab and Pilot-Plant Output . . .



Moving up to pilot-plant stage took only a month.

procedure for chrysanthemumic acid down pat. And, of course, chlorination is much cheaper than bromination. That's why we picked the chloro derivative."

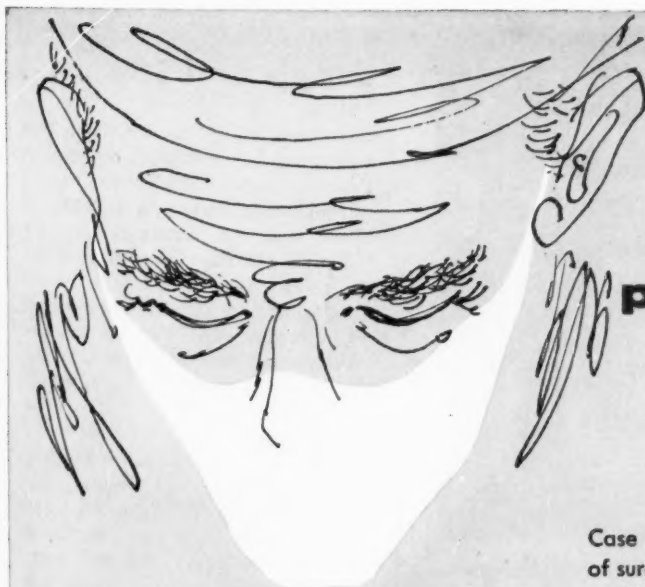
After briefly mulling over the new item with Benzol's product development consultant, Adolph Zimmerli, Freeman called USDA the following day, ironed out the details. Then the company went to work finding a method of manufacturing the new pyrethrins-like insecticide.

"Although we had our share of headaches, it took us less than a month to work up a commercial process for making Barthrin," Freeman says. "So far, we've made about 100 lbs. of it—60 lbs. of which we gave to USDA to distribute for testing—determination of uses, necessary dosages, the precise toxicity, best means of application, and the like." Another 10 lbs. of the material was sent to McLaughlin-Gormley-King Co. (Minneapolis), Benzol's sales agent, for experimental work. The remaining 30 lbs. stayed in Benzol's own research laboratory.

Because the growing season was near, Freeman rushed the new product to Washington so USDA could distribute it as quickly as possible.

"Everything about Barthrin is still in the 'preliminary-preliminary' stage, but there are indications that the new material has four major advantages over pyrethrins

Leslie Rugge, Larry Angilella work out synthesis.

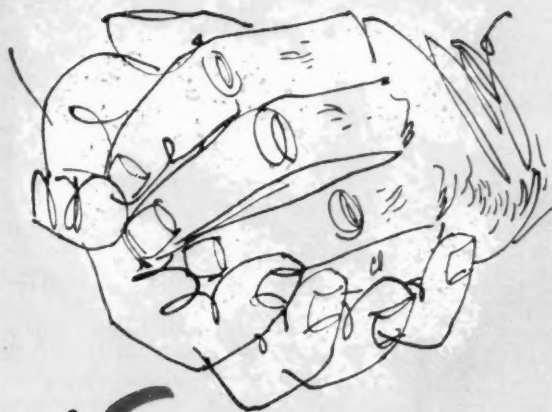


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*here's how Emersol® 233 LL
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Case History No. 83-02: "A large manufacturer of surgical and germicidal soaps continually had problems of storage stability of a high grade surgical soap. The development of rancidity and changes in color were particularly disturbing to users of the soap especially where cleanliness and sterilization are imperative. Upon investigating Emersol 233 LL Elaine, this manufacturer found it so superior to the double distilled oleic acid he had been using, that it eliminated all problems of instability and odor development. Emersol 233 was also tried in other germicidal soaps in this manufacturer's line and the improvement in stability was again outstanding."

This is but one example of how outstanding stability improved a group of products. In any product, the replacement of ordinary oleic acids by a comparable Emersol grade prevents the development of rancid odors and avoids discoloration, breakdown of emulsions, changes in texture, and any deterioration of performance. So, why risk your products' good reputation when you can guard against failures so easily—by always buying the Emersol brand when you need oleic acids.



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Freeman greets M-G-K's Joe Moore at Washington's National airport.



First 60 lbs. of Barthrin, for USDA, was on plane with Freeman.



Up the steps with 60-lb. sample to USDA's Beltsville station.

Sample to USDA . . .

and allethrin," claims Freeman. The properties of Barthrin on which Benzol is banking are low toxicity to warm-blooded mammals, stability, a broad range of killing power and lower price (compared with allethrin and pyrethrins).

Safer than Salt: Probably the greatest advantage of Barthrin is its low toxicity to animals. "It appears to be less toxic than table salt," says Freeman. USDA tests show that a cow can safely eat more Barthrin than common salt. And in acute toxicity tests on warm-blooded animals, the new compound proved to be only one-eighth as toxic as pyrethrins, one-third as toxic as allethrin—both have long been considered among the "safest" insecticides.

Killing Power: Barthrin is not only less toxic than the solidly established pyrethrins and allethrin but also appears to take action against insects resistant to the two older compounds. In preliminary tests, Barthrin appears to be quite effective against mosquito larvae, the salt-marsh caterpillar, body lice, livestock flies, biting flies, the codling moth, and possibly against the sugar-beet web worm.

Another area where Barthrin may prove valuable, although test data is still limited, is in control of the two-spotted spider mite. By using Barthrin it may be possible to keep mite buildup at a minimum. This would reduce the necessity for later application of miticides such as parathion.

Allethrin and the pyrethrins leave something to be desired as stored-grain insecticides, in larvicidal work and against the salt-marsh caterpillar. It's here that Barthrin is likely to find broadest use.

Cheaper to Make: Barthrin is considerably more expensive to make than DDT and other chlorinated hydrocarbons, but it's cheaper to make than allethrin. And it's likely to cost consumers less than hard-to-get, imported pyrethrin concentrates (now selling for \$55/lb.)

To produce Barthrin, piperonol (heliotropine) is reduced to piperonyl alcohol, chlorinated to form 6-chloro-piperonyl alcohol. Then, either chrysanthemic acid chloride or ethyl chrysanthemumate is reacted with the 6-chloropiperonyl alcohol to form the



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In the clarification of beer, POLYCLAR forms insoluble complexes with undesirable tannins. Increases chill-haze stability • improves taste and taste stability • improves foam retention • facilitates trub removal • saves on hops • reduces chillproof requirements.

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Stanley Hall, head of USDA Pesticide Division, samples insecticides.



USDA, Benzol, M-G-K representatives discuss testing program.



Field trial against mosquito larvae may prove worth of Barthrin.

Setting Up Field Trials

new insecticide. Complicated, yes, but less so than allethrin manufacture, which involves an extended multi-step synthesis in addition to requiring the expensive keto alcohol, allethrolone.

Barthrin is costly, compared with that of most conventional chloro insecticides (\$15/lb. vs. 23¢/lb. for DDT). Benzol doesn't expect the material to be used on low-profit crops, even where harmful insecticide residues are a problem. But on high-profit crops, such as lettuce, broccoli and tobacco, Barthrin looks promising.

Although Barthrin has advantages over allethrin and pyrethrins, it has a few drawbacks, too. Unlike its predecessors, Barthrin has poor knockdown power—especially against houseflies. For this reason, it probably won't be used in household insecticides. It's also relatively ineffective against roaches, another factor that will prevent it from edging out allethrin and the pyrethrins in household sales. According to USDA, however, Barthrin might find a limited market in home units, as an additive.

Even though Barthrin is a poorer knockdown agent than allethrin or pyrethrins, it's far more stable. Pyrethrum extracts break down rather rapidly.

Like allethrin and pyrethrins, Barthrin may be synergized with Sesoxane, but not to the extent that allethrin or pyrethrins may be. Benzol, however, says that "very little synergist work has been conducted on Barthrin as yet."

Insect Resistance: There is some feeling, since Barthrin has a chloro group in it, that insects resistant to other chlorinated insecticides may also have—or may soon develop—resistance to Barthrin. This has not been proved, however; in fact, insect resistance to Barthrin seems highly unlikely. According to Freeman, "Barthrin shouldn't even be considered as a chlorinated insecticide. It's probable that the mode of action of Barthrin is similar to that of pyrethrins."

Just how well Barthrin lives up to all its expectations remains to be seen. It's now up to USDA—and its associated field-test groups—to determine the true merit of the new product.



ALKANOL* DOA Disperses Solids in Non-Aqueous Systems

These familiar directions all call attention to the long-felt need for a product that will disperse solids in non-aqueous solutions.

ALKANOL DOA, a copolymer, is just such a product. After a solution has been treated with it, sludge formation and separation will be minimized.

So far only the surface of ALKANOL DOA's possibilities has been scratched. It is new and its potential is infinite and varied. Here are a few suggestions to show some of the directions in which it might help you. In heat transfer oils in distillation... in quenching oils... in paints... inks... polishes... oil-based, external pharma-

ceuticals... dry cleaning fluids... to prevent fouling in reboilers and other processing equipment.

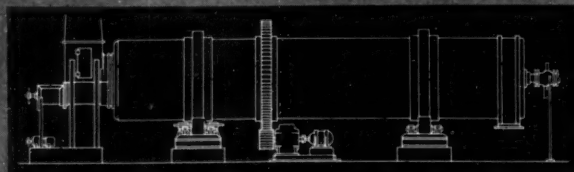
We can tell you that ALKANOL DOA is an "ashless" product and can be burned. It is a bright orange, viscous fluid. It is aromatic and has a toxicity equal to that of kerosene. (It normally comes in a kerosene base.) In all applications so far, costs have been entirely reasonable.

Let us send you a working sample of ALKANOL DOA. It may make your products even better than they are. For further details and sample, drop a line to E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyes and Chemicals Division, Wilmington 98, Delaware.

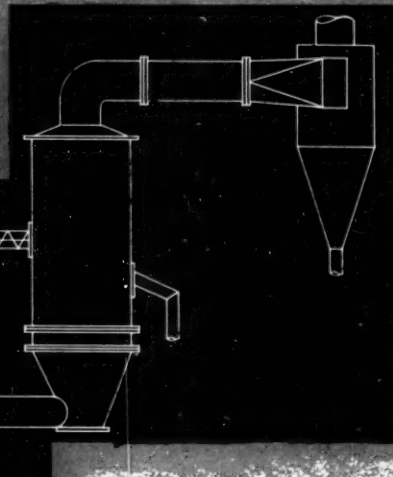
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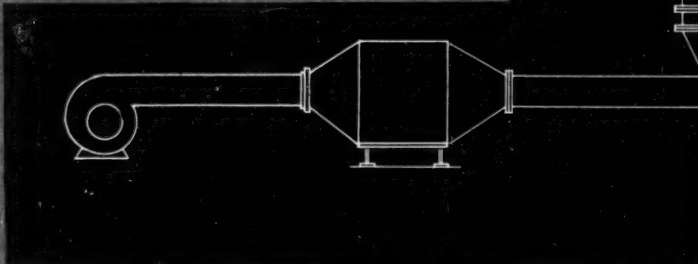
Better Things for Better Living
... through Chemistry



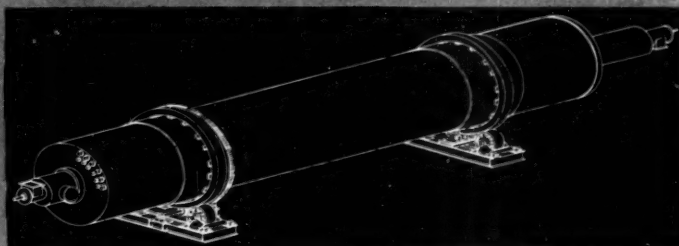
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1. Salt-water cooling tower will be built here, at California Oil Co.'s Perth Amboy, N.J., refinery.
2. First salt-water cooling tower, here, built in '56 and expanded in '57, services the nearby units.
3. Towers overcome lack of fresh water, save high cost of pumping directly from salt water, here.

Salt-Water Tower Eases Water Pinch

Process industry companies hard pressed for fresh water for cooling will be taking special interest in the cooling tower soon to be built as part of expansion now under way at California Oil Co.'s Perth Amboy, N.J., refinery. Strongly resembling conventional fresh-water cooling towers, the new installation has a major difference — it will cool salt water instead of fresh water.

The unit, one of the few salt-water cooling towers ever designed for U.S. industry, will offer a particularly good chance to examine the economics of cooling and recirculating salt water when the cost of pumping directly from a primary salt-water source is high and when fresh water is unavailable.

These conditions confronted California Oil, which needed 12,000 gpm. of cooling water for a new, 10,000-bbbl./day catalytic reformer. California Oil, a subsidiary of Standard Oil Co. of California, appointed

Standard's engineering department to analyze the problem. The solution, an induced-draft, counterflow redwood cooling tower for salt water, will cost substantially more than a similar fresh-water cooling tower installation. But a system to pump salt water directly from the Arthur Kill, an arm of New York's lower bay, and install separators, etc., would have cost 65% more than the cooling tower system.

The solution represents a vote of confidence for California Oil's first salt-water cooling tower, also initiated by Standard's engineering department. A 6,000-gpm. unit built at Perth Amboy in '56 and expanded to 15,000 gpm. last year, it is said to be the only salt-water cooling tower operating in the chemical process industries.

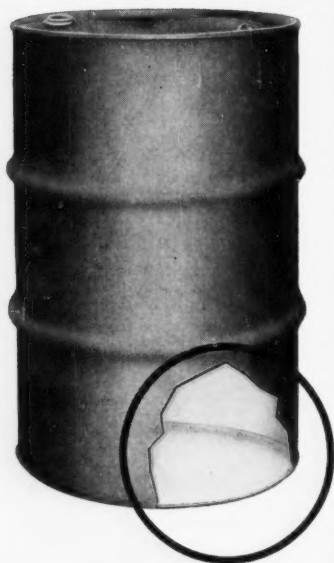
Pumping Not Enough: The use of salt-water cooling towers reflects the refinery's continual expansion, requiring new means to slake process-unit thirst economically. Originally, cool-

ing water was supplied from nearby Woodbridge Creek. But discharge of hot industrial waste water by upstream industries often caused the creek's temperature to rise to 95 F in summer.

In '50, when new process units were added, the refinery switched to the cooler salt water of the Arthur Kill, built a 45,000-gpm. pumping station. And the old Woodbridge Creek pumping station was turned over to supplying the fire-fighting system. But by '56, the refinery's cooling-water demand had reached the Arthur Kill station's maximum capacity. Cost of expanding the salt-water pumping system, when compared with the cost of installing a salt-water cooling tower, came out a poor second.

Standard's engineers knew of three other salt-water cooling tower installations: two towers for cooling salty ground water, operated by the Nebraska Public Power System at Lin-

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PRODUCTION

coln—a 34,000-gpm. unit built in '50 and a smaller unit operating since '30; and a 57,500-gpm. tower for cooling Neches River water, operated by the Gulf States Utility Co. of Beaumont, Texas.

Different Systems: The major design difference between its first ('56) unit and new tower installation lies in completeness of the recirculating systems. The first tower was built to augment the supply of cooling water to match the expansion in existing process units. The first tower system is only partly recirculating. The new tower will supply a new process unit, is almost completely recirculating.

In the first system, water from the tower is blended with water pumped directly from the Arthur Kill station on its way to several process units. After use in processing, the water is segregated—clean water is discharged into Woodbridge Creek, oily water goes to a separator before discharge. Supply water for the tower is drawn from this disposal system.

In the new system, two 6,000-gpm. centrifugal pumps will draw from the tower basin, circulate the water through the new catalytic reformer, return it to the top of the tower for cooling from 115 to 82 F. Make-up water (about 13%) is added to the system, keeps it up to 12,000-gpm. capacity.

Make-up water will come from the salt-water processing system before it discharges into the oily water disposal system. High rate of make-up was not an actual requirement, but was decided upon because make-up water is plentiful. The tower system will increase dissolved and suspended solids about 30%. But tower-water solids will still be somewhat below solids content of normal sea water (about 35,000 ppm.), since water from the Arthur Kill contains only about 20,000 to 25,000 ppm. of dissolved solids. However, Standard's engineers do not regard the tower as limited to operating only with water containing less than the dissolved solids in normal sea water.

Water treatment is not used in the first tower, is not planned for the new. But both towers differ from fresh-water towers in certain design and construction-material features.

Low Drift: Drift (windage) loss had to be limited to prevent salt water corrosion of nearby equipment. Max-

imum drift has been set at 0.1% of the flow, although it is expected to be dropped as low as 0.02% in the new tower.

To limit drift, tower air velocity will be kept low, and the plenum chamber (air-outlet system) will be deeper than on conventional towers. Drift eliminator blades will be closer to horizontal, and drift eliminators will be sloped to move them further away from the distribution system.

All redwood posts extending into the tower's concrete basin will be creosoted to prevent attack by marine borers. The basin will be constructed of dense 4,000-psi. concrete using sulfate-resistant cement.

Interior hardware, which is silicon bronze in the first tower, will be Monel in the new one. Other metal parts (e.g., cases for gears, motors and fans, and drive shafts) will be Heresite-coated. Pumps in the first tower have either stainless-steel or Lithgow-lined cast-iron cases. Pump cases in the new tower will be of cheaper stainless steel. Pump impellers will be stainless steel, shafts will be Monel. And cooling-water lines will be cement-lined steel pipe.

Three cooling tower manufacturers have had a hand in the projects—Fluor Corp. (Los Angeles) provided the original tower, Foster Wheeler Corp. (New York) added the second unit to it, and G. W. Galloway Co. (Arcadia, Calif.) will furnish the new tower. And, now that California Oil has shown the way, it's a good bet that these firms and others will be in on other process industry projects for salt-water cooling towers in the future.

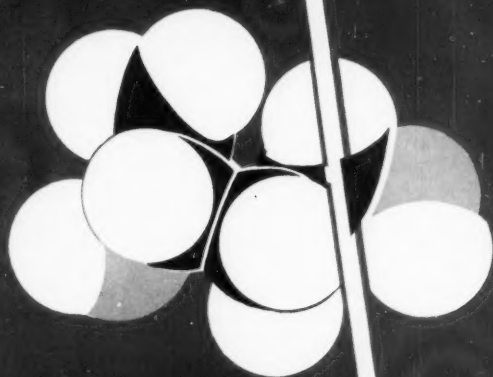
EQUIPMENT

Photometer: American Instrument Co. (Silver Spring, Md.) has what it calls an Absolute Light-Scattering Photometer, credits it with having improved sensitivity and accuracy. Applications include studies of high-molecular-weight compounds, determination of particle sizes in the micron and submicron ranges, recording of haze and turbidity in moving streams of liquid.

Heavy-Duty Pumps: Two firms are out with new pumps designed specifically for problem applications.

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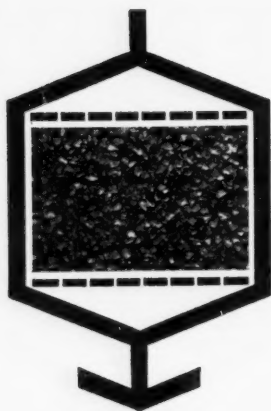
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PRODUCTION

(Port Washington, N.Y.) offers its Model 120, said to feature exceptional efficiency in pumping slurries, viscous materials, high-temperature and low-temperature materials at high flow rates and pressures. Model 120 measures 14-in. long, has a diameter of 9½ in. Capacity: up to 500 gpm.

Nagle Pumps, Inc. (Chicago Heights, Ill.) has a new "K" series of pumps. Featuring an exposed shaft, the new line is designed for handling hot liquids. Of the three basic designs offered, Type "KR" is for use with limited heads, Type "KC" for corrosive or mildly abrasive applications, Type "KF" for high-pressure abrasive or corrosive applications. Capacities are about 4,000 gpm.

Portable Air Compressor: LeRoi Division of Westinghouse Air Brake Co. (Milwaukee) is marketing what it says is the world's largest portable rotary air compressor. Rated at 1,200 cfm. of free air compressed to 100

psi., the LeRoi 1200RD2 has a dry weight of 14,700 lbs. Designed as a twin compressor, the unit allows independent operation of each component, each rated at 600 cfm.

Teflon Gloves: Surety Rubber Co. (Carrollton, O.) offers a new industrial glove completely impervious to strong acids and solvents. The company says that the gloves, made of Teflon, withstood tests in fuming red and white nitric acids, 100% sulfuric acid, organic solvents.

Electric Power Control: A new locking-contact wattmeter makes possible direct monitoring and control of electrical power by a single instrument, according to Assembly Products, Inc. (Chesterland, O.). With the locking feature, said to be the first ever built into a wattmeter, wattage limits may be preset, with control action being initiated when a limit is reached. Price of the unit is \$200.



Extra Heating Aids Corrosion Study

Study of corrosion rates of heat-exchange materials gets a boost from this bank of equipment at Carpenter Steel Co.'s new corrosion research laboratory (Reading, Pa.). Using heating mantles to heat the corrosive solutions and soldering irons to supply independent heating to the specimens,

Carpenter gets a truer picture of actual conditions than by methods in which the sample temperature is the same as that of the corrodent. This and other apparatus in the new lab is aimed at allowing the firm to predict corrosion rates of new untried materials for process equipment.

New low-melt polyethylene...

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Epolene C, a new type of polyethylene, possesses many of the properties generally associated with plastic grade resins and yet can be handled much like a moderate to high melting point wax.

Because of its wax-like characteristics, Epolene C can be handled as a melt, with or without modification. At 300°F, for instance, the viscosity of the new resin is 8,000 centipoises. The addition of 25% paraffin, with which it is completely compatible, reduces the viscosity to only 1,300 centipoises at this temperature.

The pourability of Epolene C at moderate temperatures points the way to new product opportunities and low-cost production techniques in the manufacture of toys, novelties, art objects and reproductions, housewares or any product capable of being formed by slush or rotational molding or casting.

With Epolene C, paper converters can use wax-coating machines, modified to operate at somewhat higher temperatures, to apply polyethylene directly to paper sheets or web.

Investigation of these and other uses for Epolene C is continuing at Eastman's customer service laboratories. We will be glad to supply samples and further information and to assist you in evaluating this newest addition to the polyethylene family. Write to Chemical Division, Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tennessee.

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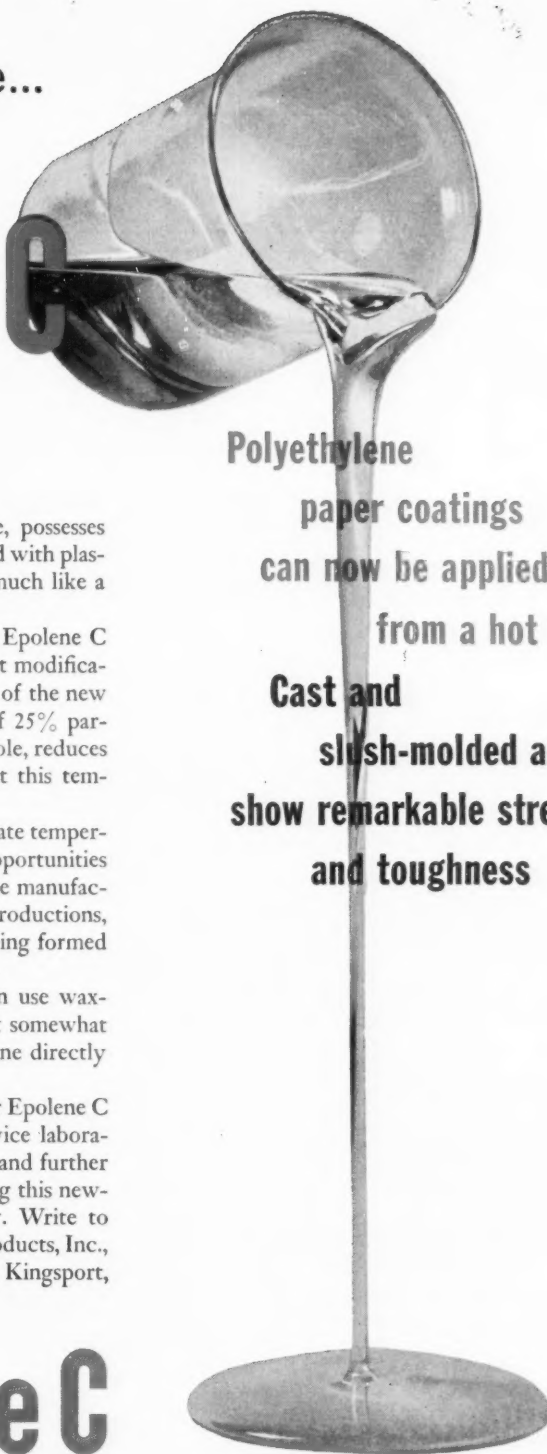
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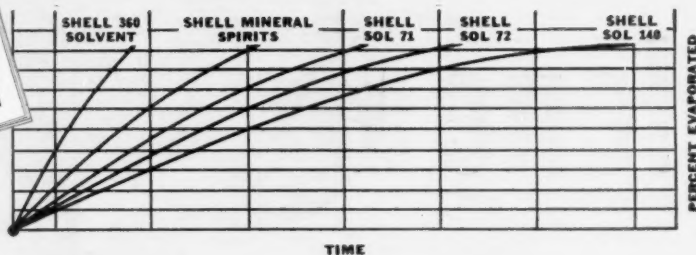
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Technology

Newsletter

CHEMICAL WEEK

June 14, 1958

Look for new word from Union Carbide Chemicals on ethylene oxide process improvements. Worked out during the past year and now used in all of UCC's existing ethylene oxide plants, the process innovations reportedly have increased the company's total capacity by 60 million lbs./year. The same improvements—primarily modified reaction conditions and general engineering changes—will be incorporated in two new ethylene oxide units to be built by Carbide affiliates in Puerto Rico and England.

•

Dramamine-D, a new version of the motion-sickness drug, will soon be introduced to the market by G. D. Searle & Co. (Chicago). A combination remedy, it teams the proved effect of 2-(benzohydroxy)-N, N-dimethylethylamine 8-chlorotheophyllinate (Dramamine) to combat nausea with the mildly stimulating effect of dextroamphetamine to offset drowsiness sometimes caused by conventional Dramamine formulation.

•

The growing use of burnable poisons for control of nuclear fuels was one of the most-discussed topics at last week's American Nuclear Society meeting in Los Angeles. Particularly desirable for military and research reactor systems that operate at high flux, the burnable poisons are said to simplify control by making the reactor self-governing, to permit longer operation before refueling.

New techniques are employed to select commercially available poisons—boron, lithium, mercury and certain rare earths—that have high neutron-absorption properties and that are consumed at the same rate as the fuel. Because these materials can be dispersed through the fuel, they minimize hot and cold spots that may result from localized neutron absorption when only control rods are used to regulate a high-flux nuclear reaction. Result: more uniform flux, higher efficiency.

Some disadvantages of using burnable poisons: metallurgical problems of incorporating them into the fuel; possible complications in the reprocessing of poisoned fuel (*see p. 39*).

•

Construction of Freeport Sulphur's offshore sulfur mining plant, seven miles out in the gulf, at Grand Isle, La., starts next week with the sinking of the first section of a steel island, expected to be the largest such structure in the world. A key part of the company's \$30-million project to exploit the deposit, the Y-shaped structure will accommodate drilling platforms at the ends of two of its three 1,300-ft.-long arms; heating plant, shops and living quarters for the 260-man crew will be on the third arm.

The sulfur deposit will be tapped by numerous Frasch-process wells drilled directionally from each of the drilling platforms. Some 13 million cu.ft./day of natural gas will be piped out to the island to produce

Technology

Newsletter

(Continued)

electric power for the drilling rigs and other equipment, to heat 5 million gal./day of sea water, treated by Freeport's patented process, for injection into the underground formation.

The company is still undecided on a method of transporting the sulfur back to shore, is currently weighing the merits of a heated pipeline vs. the use of conventional molten-sulfur barges. Construction of the man-made island is scheduled for completion by the end of '59, with sulfur production due to start sometime in '60.

Hydrogenation of light petroleum distillates will be employed to produce 5 million cu.ft./day of commercial gas in a new plant to be built near Bristol, England, by the South Western Gas Board. Scheduled for completion in '60, the plant will use the Dent hydrogenation process developed by F. J. Dent, research director of the Gas Council's Midlands research station.

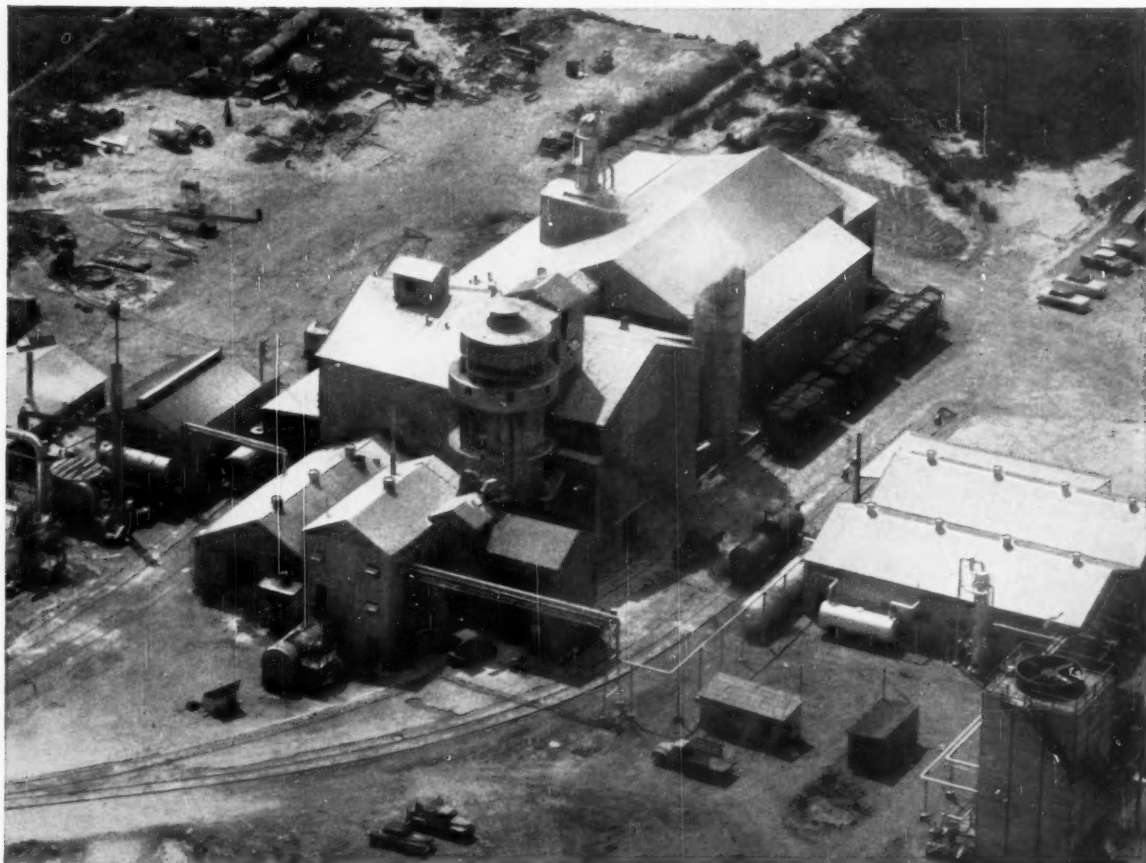
Key process steps involve desulfurization of vaporized feedstock, followed by hydrogenation of the vapor. The former is accomplished with a molybdenum catalyst and iron oxide purification; the latter by treating the vapor with a stream of 80%-pure hydrogen as it passes through a bed of fluidized carbon. The hydrogen is produced by steam-reforming part of the hydrocarbon gas in a fluidized bed of nickel catalyst.

In addition to the product gas (a blend of hydrocarbons, hydrogen and a diluent that adjusts the mixture to standard calorific value), the process yields several by-products, such as benzene, naphthalene and granular carbon.

Two other Dent-process plants have been planned recently: one by the Scottish Coal Board, which will incorporate hydrogenation into a Lurgi high-pressure process using coal as the feedstock; one by a North Western Gas Board facility that will use heavy oils, initially, and later switch to coal.

A new hormone that has possibilities for oral-contraceptive use has been developed by The Upjohn Co. (Kalamazoo, Mich.). It's called Provera, is 6- α -methyl-17- α -acetoxyprogesterone. Clinical evaluation indicates usefulness in the prevention of miscarriage or premature birth. Upjohn researchers claim that provera is "up to 300 times as potent as drugs now in use for this purpose."

New potential for gibberellins has turned up in research done at University of California. Potassium gibberellate on navel oranges raised the juice content 9% and the vitamin C content 13%, had no effect on sugar content, total acids, puffiness, size, weight and tendency to drop. Researchers are also tagging gibberellins with C-14, hope to measure the plant growth agent's residue in fully grown plants.



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The list of phosphate products made by Shea has grown rapidly in eight years. Now, Shea is embarking on plans for further diversification. Two laboratories—at Adams, Mass. and Jefferson-

ville, Indiana—are busily engaged in research on an entire new range of phosphate chemicals. Of primary interest are the increasingly important organo-phosphates.

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MARKETS



Signing up to hear about chemical products' chances in construction were CCDA members.

CW PHOTO—S. A. SAND

Probing Potential of Building Trades

What opportunities and development problems now confront marketers of chemically derived construction materials such as foams, surface coatings, adhesives? And how best can these materials be successfully introduced to the building trades? These questions were explored last week at the spring meeting of Commercial Chemical Development Assn.

The sessions were conducted, appropriately, in Niagara Falls, N.Y., midst many of this year's crop of newlyweds who represent the nation's newest segment of the house-buying public.

The basic points of the fact-packed technical session were that there are

now substantial potential markets for several important synthetic construction materials and that the chemical industry has a need—an obligation—to expedite the acceptance of new materials by the country's vast building industry.

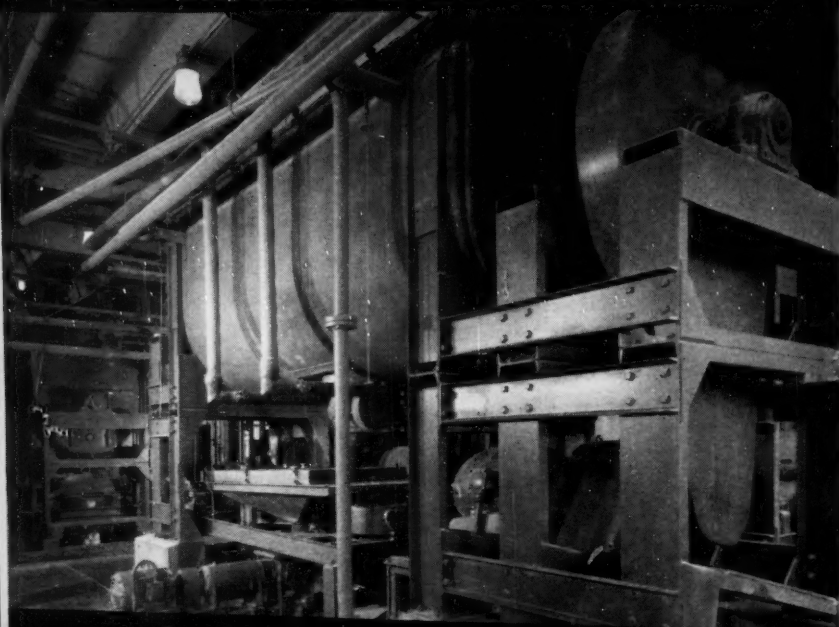
The sales potential, said William Demarest, of Manufacturing Chemists' Assn., justifies any effort to expedite the acceptance of new materials by the nation's \$40-billion/-year construction industry, which already consumes about \$150 million worth of plastics and resin materials annually. These chemical products go into construction materials and products valued at \$500 million; if surface coatings were included, total

value would be just over \$1 billion.

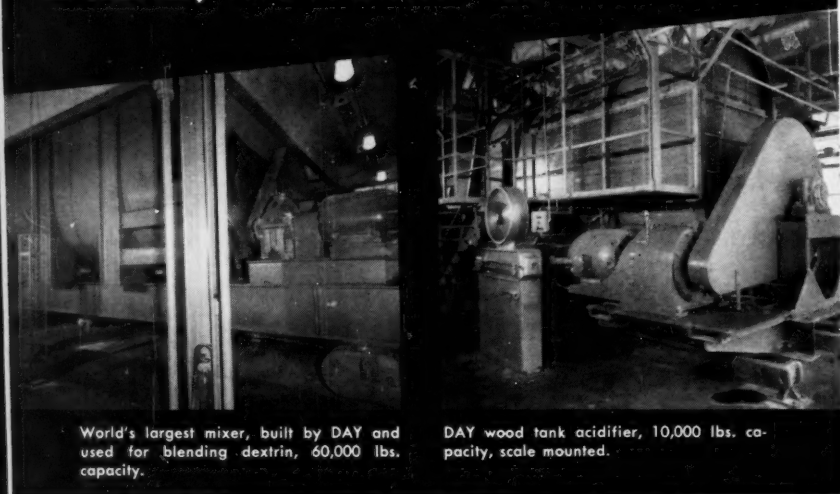
Use of these synthetics in building, he said, has increased an average 15%/year; and by the mid-'60s, consumption of material using or made of plastics may be worth some \$2 billion. But this goal will be achieved, he warned, only if communications with the building industry are developed to a high degree.

How to Sell Them: The problem of selling chemical products in the right way and for the right construction purposes was emphasized by several other speakers. Glen H Beyer, director of the housing research center at Cornell University, asked bluntly, "Is the building industry searching for both the highest-

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MARKETS

quality building products and the best way of putting them together in functional and attractive package to give the home buyer more value per dollar?" His terse answer: "No."

The building industry's policy and practice, he explained, should be to use materials where they are best suited, and not attempt to use one material for all products; manufacturers must know what needs the buildings are to serve; then they can design their products accordingly.

Several speakers expressed considerable dissatisfaction with the nation's building codes. Herman W. Zabel, vice-president of Roger Williams Technical and Economic Services, called the tight codes a "strait-jacket" on the industry.

Another point elaborated by Zabel was the construction industry's complex distribution problem. Better control of distribution practices, he said, could make a greater contribution toward lowering construction costs than could introduction of new materials—although new materials are needed to reduce costs and improve present imperfect structures.

Foam Future: Joint contribution of Dow's William C. Goggin and Robert N. Kennedy was a look ahead at future markets for plastic foams.

One of their many points was cost—often a serious limitation to advancement of foams in construction uses. Not hampered by the primary problem of cost—though having other drawbacks—are three plastics, phenolic, polystyrene and polyurethane foams.

Here's how costs of the latter three expanded plastics compare:

Material	Cost
Phenolics	30-60¢/lb. 8¢/bd. ft.
Polystyrene	25-45¢/lb. 10¢/bd. ft.
Urethane	75¢-\$1.25/lb. 16¢/bd. ft.

Paint Perk: Before launching into a detailed discussion of the paint industry, John C. Weaver, of Sherwin-Williams, noted that the paint business has suffered less in the recession than many others. Whereas some heavy industries have been depressed as much as 50% in recent months, he

Using Salt Efficiently

by INTERNATIONAL SALT COMPANY, INC.



How to Measure Brine Strength on Different Hydrometer Scales

The most common method of measuring brine strength in industry is to use some type of hydrometer. Every hydrometer sinks into a liquid until it has displaced a weight of the liquid equal to its own weight. The scale divisions on a hydrometer are not usually of equal length, since the volume of displaced liquid increases as more of the stem is immersed.

Using a hydrometer is a relatively simple process—but reading the hydrometer scale is complicated by this fact: the scale may vary from plant to plant because hydrometers may be used to measure strength of other liquids, as well as salt brine. To help clear up any possible confusion, here are an explanation and a comparison of the five most common hydrometer scales used for measuring brine strength.

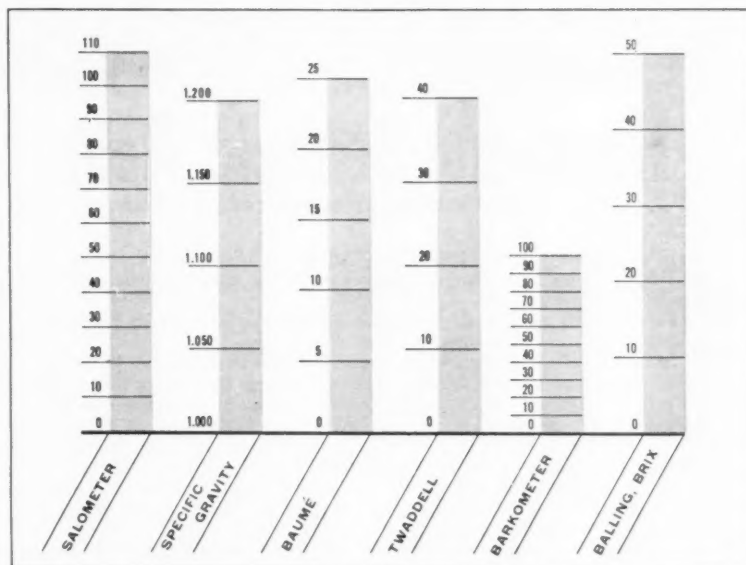
SALOMETER SCALE. This is by far the most common of all the hydrometer scales used for testing brines. The scale indicates directly the per cent saturation of the brine, reading 0° S. in pure water, and 100° S. in fully saturated brine. The salometer uses the values of Gerlach, meaning that 100%-saturated brine contains 26.395% salt by weight. Each salometer degree, then, represents 0.2639% salt.

The salometer reading expresses the per cent of saturation. Thus, a brine of 40° S. strength is 40% saturated, and contains 40% of 26.395%, or 10.558% salt by weight.

SPECIFIC GRAVITY SCALE. This reads the specific gravity of the brine directly. These hydrometers may be obtained with the entire length of scale covering a limited range of specific gravities, thus permitting great accuracy.

BAUMÉ SCALE. This scale was originally intended to have each degree equal a per cent of salt in the brine. But this is now only a rough approximation. The Baumé scale reads 0° Bé. in pure water, 24.6° Bé. in fully saturated brine. Also, a factor of "modulus" is needed to translate degrees Bé. to specific gravity, since the scale divisions are of equal length. This modulus has been standardized at 145, so that degrees Bé.=145-145/sp.gr.

TWADDELL SCALE. Named after its inventor, the Twaddell scale reads 0° Tw. in pure water, 40.8° Tw. in fully saturated brine. Each increase of 0.005 in specific gravity causes 1° increase on the Twaddell scale. Thus, the



COMPARISON OF COMMON HYDROMETER SCALES

(Chart gives quick, visual relationships of readings on the salometer scale to readings on other scales.)

number on the right of the decimal point of the specific gravity, divided by 5, is the degrees Tw. For example: 1.140 sp.gr. is 140/5, or 28° Tw.

BARKOMETER SCALE. Used extensively for testing tanning liquors, the Barkometer scale reads 0° Bk. in distilled water, and 204° Bk. in fully saturated brine. Each increase of 0.001 in specific gravity causes 1° increase on the Barkometer scale. Thus, the number on the right of the decimal point of the specific gravity is the degree Bk. For example, 1.025 sp.gr. is 25° Bk.

The hydrometer scales described above are usually calibrated for brines at 60°F. temperature. When testing brines at other temperatures, it's necessary to make certain corrections... or to use a specially designed hydrometer. You can get a table

showing proper temperature corrections, plus other data on measuring brine strength, from International Salt Company.

Using salt in its many industrial applications calls for technical knowledge and experience. International Salt Company has both—plus a continuing program of research and development in salt. These things can be put to work for you... in your plant... to help you get the most out of the salt or brine you use.

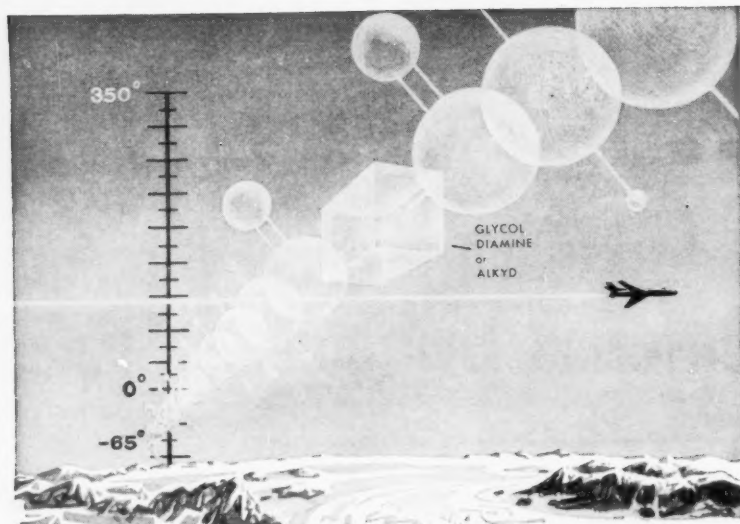
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MARKETS

said, the paint industry in the first quarter of '58 was only 7.4% below the same period of '57. This is an average dip of only 2% in trade sales paints and 14% in industrial finishes.

Estimated value of the paint industry is now \$1.6 billion, said Weaver, and probably represents about 500 million gal. of products. About 60% of all paint made is classified as trade sales, the remaining 40% as industrial.

Unfulfilled needs in the paint industry, according to Weaver, include: fungicides not having adverse effects on paint, plant, and animal life, bactericidal paints free of similar adverse effects; good yellow pigments; answers to solubility and recrystallization problems in other colors; corrosion inhibition in water-system paints for metals.

He said the trend toward edge-stripping of highways is a practice that could more than triple the paint requirements (mainly alkyds) per mile of highway.

Adhesives in construction and structural moistureproofing were also discussed in considerable detail. A steadily growing use of adhesives in construction was anticipated by D. W. Maher, of Minnesota Mining. Reason: their suitability to prefabricated building components.

Special emphasis is on development of high-strength structural adhesives (i.e., adhesives whose bonds equal or exceed strengths of materials joined).

Maher's optimism about the future of adhesives was shared by Walter C. Voss, of Massachusetts Institute of Technology, who noted "development of synthetic adhesives has been one of the most important contributions of the chemical industry to the new approach to construction."

New materials in moistureproofing—involving barriers for walls, floors and ceiling construction, crack fillers, joint-sealers—were discussed by Neil Catton, of Du Pont.

Clearly, the market potential for synthetic materials in construction is tremendous; but consensus of experts at the CCDA meeting was that technology isn't enough—far better coordination between suppliers and users of these synthetic chemical products is essential if the full market prospects are to be realized.



*The men that
make the most of them . . .*

test your Polyol I.Q.

How well do you know your Polyols? Here are questions about a few of the hundreds of Polyols that Dow makes. Some of them are common as can be, some not so common, others you may not have heard of. How many can you name? **TIME ALLOWED: 4 MINUTES, READY . . . GO!**

1. What two Polyols are such good tobacco humectants that we are serious when we say, "put them in your pipe and smoke it"?

* * * *

2. What Polyol, due to excellent aqueous antifreeze properties and low toxicity, can be used in refrigeration systems whose coils are in direct contact with food?

* * * *

3. What Polyol made both synthetically and naturally is viscous, sweet, and is widely used in cosmetics, pharmaceuticals and tobacco?

4. What Polyol is so versatile that it is used to release automobile tires from their manufacturing molds, is a major constituent of automobile brake fluids, and in case you have a convertible, will not only lower the top, but will also keep your hair well-groomed as you breeze along with the breeze?

* * * *

5. What well-known Polyol, due to its low price and excellent color characteristics, is used most extensively in the polyester field?

6. What group of Polyols is finding wide acceptance in the cosmetic and pharmaceutical industries and is used as a carrier? Also used to replace natural gums?

* * * *

7. What one Polyol is so versatile that it finds extensive usage in the manufacture of synthetic fibers, dynamite, alkyd resins and antifreeze?

* * * *

8. What versatile Polyol—a surfactant intermediate, plasticizer, urethane cross-linking agent—owes its exceptional usefulness to its eight OH groups?

KNOW YOUR POLYOLS—A score of 4 out of 8 gives you a passing mark; 5 out of 8 puts you in the top half of the class; 6 out of 8 makes you a real promising Polyoler; 7 out of 8, you're a genius second-class, and 8 out of 8 makes you a Professor of Polyolotry (entitles you to a free, illuminated certificate, testifying to your Polyol prowess).

We hope this quiz whets your appetite to know more about Polyols. Many brochures, technical papers and bulletins, including Dow's new folder, "World's Widest Line of Polyols", are available from your nearest Dow sales office. Or, write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Department GD 949B.

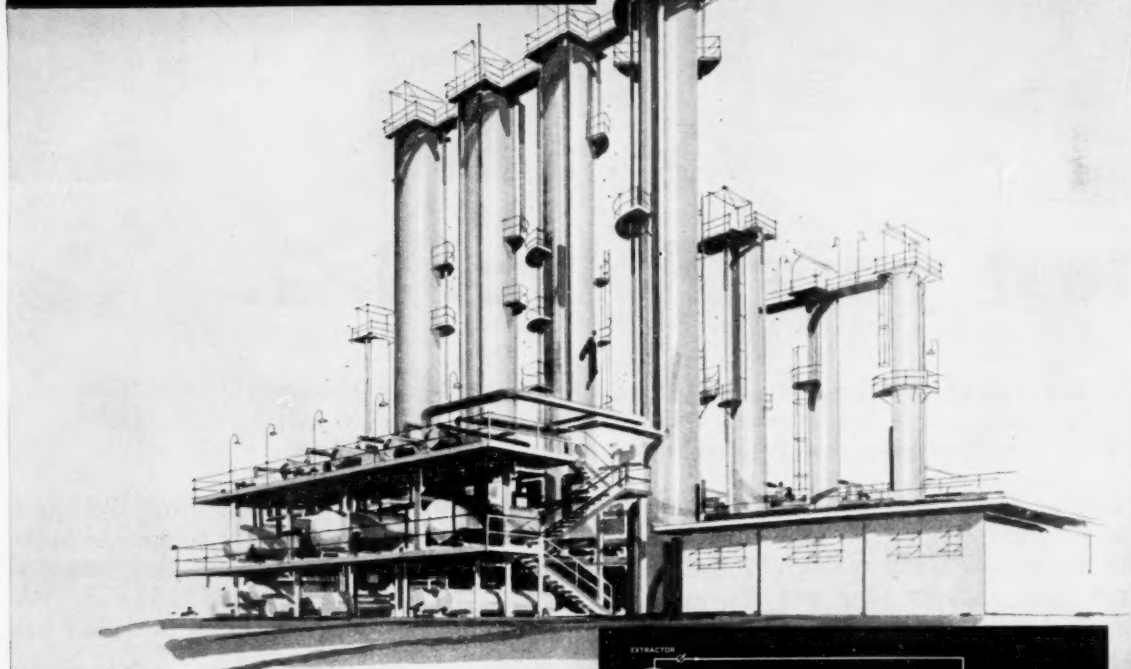
ANSWERS:

ANSWERS:
(1) Propylene Glycol USP and Glycerine USP. (2) Polyglycol
Propylene Glycol USP. (3) Glycerine. (4) Polyglycol
15-200. (5) Propylene Glycol Industrial. (6) Poly-
ethylene Glycols. (7) Ethylene Glycol. (8) Hyprose®
SP 80 (reaction product of sucrose and propylene
oxide).

YOU CAN DEPEND ON

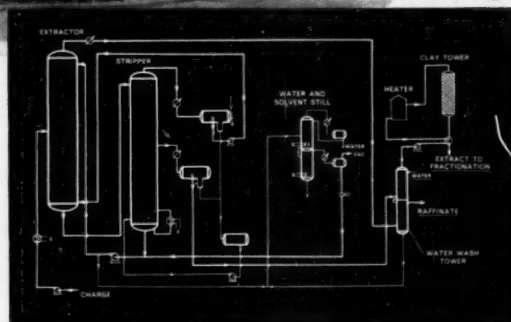
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You can get substantial production of high-purity aromatics and still keep costs at a minimum with UOP's Udex extraction process. Udex-processed benzene, toluene and xylenes not only meet nitration-grade specifications but exceed these requirements in purity. These aromatics are produced at extremely low cost, since relatively inexpensive and readily available glycol solvents are used in the process. Utility requirements are considerably lower, too. The versatile Udex process permits recovery of aromatics from catalytic reformates, from by-product light oils produced in coke-oven operation, from thermal aromatic



concentrates such as ethylene co-product light oil fractions and other aromatic-rich by-products. Although most petrochemical processors place major emphasis on recovery of benzene, toluene and xylenes, the Udex process also permits recovery of heavier aromatics and dicyclics in high purity. Udex, originated by the Dow Chemical Company, is just one of many UOP refining and petrochemical processes available to the refining industry. A booklet on the UOP Udex process is yours for the asking. For a detailed description of this process, how it works and the economic factors of cost and production, write us on your company letterhead.



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ADMINISTRATION



Sacred-robed Japanese dancers 'drive away ill fortune' at dedication of Reichhold's new plant.

Dedicating a Plant — Japanese Style

Musing upon a plant dedication that included a Shinto ceremony, geisha girls, native music and a \$5,000, 50-table buffet, three of Reichhold Chemicals, Inc.'s top home-office executives last week were convinced that opening a plant in Japan is quite unlike anything they have ever encountered in the U.S.A.

Aside from dedication ceremonies, one RCI official told *CW*, doing business in Japan is like doing business in any foreign country interested in American know-how and capital. It can be a rewarding experience.

On May 20, Reichhold President Henry Reichhold, Board Chairman C. J. O'Connor, and Fred Jolles, vice-president in charge of RCI's foreign division, attended the two-day dedication of the company's 24th foreign plant—a \$1.25-million facility at Amagasaki, just outside Osaka,

Japan's second-largest city. The plant—the third for RCI's Japanese subsidiary, Japan-Reichhold Chemicals—is the second in the Osaka area and doubles the company's synthetic-resins capacity there. The remaining plant is in Tokyo, where additional facilities are being planned. Within a few years, RCI expects to construct a plant at Nagoya, Japan's third-largest city.

This rapid plant growth since '50 has pushed Japan-Reichhold's output of plastics, synthetic resins and Poly-lite to 1,000 tons/month, up from 50 tons/month seven years ago.

Unusual Dedication: Highlight of the plant dedication was the hour-long purification ceremony called a "misogi" or "oharai," which took place in the 1,600-year-old Shinto shrine at Nara, south of Osaka. Two Shinto high priests officiated; sacred-

robed dancers performed to music played on a bamboo flute, a Japanese harp (or koto) and two drums—"to please the 8 million gods and drive away ill fortune" and to bless the company's executives.

The next day, 500 customers and guests attended a lavish buffet party at the new plant. Fifty geisha girls waited upon guests at the party, which reportedly cost 1.8 million yen (\$5,000), a sizable sum for a buffet even in Japan where presenting such ceremonies is a fine art.

Same Overseas Policy: Groundwork for Japan-Reichhold was similar to that of the RCI subsidiaries in 18 other foreign countries—a market for synthetic resins and plastics was first created by exports to the area. In '30, RCI began exporting to Japan through its Yale-educated agent, Hiroyuki Kobayashi. Twenty

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MANUFACTURING CO.
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ADMINISTRATIVE



Plant's main office building has latest comforts, including pool.

years later, in '50, an agreement was reached with the president of Dainippon Printing Ink Corp. to establish JRC. The 10-year pact, with renewal rights for another 10 years, called for RCI to furnish capital, technical know-how, training and other assistance and licensing. Traditionally, RCI helped with the design of the first and subsequent plants. Now, RCI owns 45% of JRC. Dainippon owns the rest.

The parent company is represented on JRC's board of directors by four executives, including Jolles. These men, in turn, are represented by proxy at the monthly board meeting by Kobayashi.

President of JRC is Katsumi Kawamura, who told employees at the dedication that the company intended to replace Australia as RCI's third subsidiary. He pointed out that the company is already Japan's foremost producer of plastics.

Commenting on the Japanese sub-

sidary's drive to gain position in the Reichhold complex, O'Connor said he was convinced it would, because of its quality products, Japanese know-how, the cooperation of Japanese technicians with their management and good customer relations.

Before leaving last month for the dedication, Jolles told CW in his White Plains, N.Y., office that doing business in Japan has many advantages. Wages and salaries are low, he said, and royalty and dividend payments can be withdrawn without difficulty. Taxation, he added, is comparable to that of many industrialized foreign countries, and there are no special dispensations. At present, credit is tight in Japan.

Jolles pointed out that Japan is now in the third year of a five-year plan for economic and industrial development. Part of the plan calls for encouraging foreign investments, particularly for the production of goods now being imported.

Dedication buffer was lavish, even by Japanese standards.





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Epoxidation and other reactions of hydrogen peroxide can

lead you to such new and improved products as adhesives, drugs, unusual coatings and resins, lubricant and grease additives, and constituents of rubber formulations.

Du Pont chemists are now working on many new and profitable uses for hydrogen peroxide in the broad field of organic chemistry. Streamlined epoxidation techniques are just one result of these efforts. If you would like more information or help in finding profitable new applications for peroxide, just write on your letterhead to the address below.

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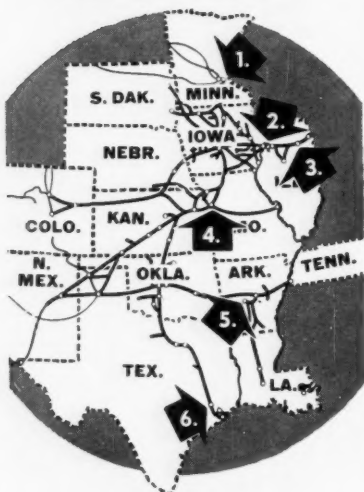
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ADMINISTRATION

Plant-Town Pollution Team

Concerted industry-community efforts to control water pollution began to pay off last week when American Cyanamid dedicated its brand-new \$4.5-million effluent-treatment plant at Bound Brook, N.J.

Cyanamid's new plant blends the community and industrial goals for waste treatment, actually processes nearby community waste effluents as well as its own, with the communities sharing in the operating costs. It's said to be the only unit of this kind in the U.S.

Water Source: Cyanamid's stake in the venture is high. Every day, it removes from and returns to the nearby Raritan River some 20 million gal. of water it uses in making more than 800 chemical products. Upstream of Cyanamid's plant lie the boroughs of Somerville and Raritan and Bridge-water Township, while downstream lie New Brunswick, Perth Amboy and New York's lower bay. So situated, the plant must have clean water for its processes, must send clean water down-river.

Some years ago, Cyanamid and other industrial and civic organizations in Somerset County were approached by the Middlesex Sewerage Authority. This agency treats waste for Middlesex County, which is adjacent to Somerset and includes the city of New Brunswick. It asked Cyanamid to participate in a program whereby wastes from the Somerset groups would be piped out to Raritan Bay and there treated. Cyanamid declined to do this. Removing 20 million gal. of water from the river for the plant, then piping it to the bay, said Cyanamid, could dry up sections of the river between the plant and the bay. The company's refusal to participate in this plan meant that the three communities above the plant would have to build pipelines all the way to the bay if they wished to use the Middlesex plan. To help them avoid this, Cyanamid suggested the creation of an organization with even broader scope—the Somerville-Raritan Authority.

New Plant: Now, under a 20-year contract with SRA, Cyanamid's treatment facility processes its own wastes and provides secondary treatment for the community's wastes. The agency

will provide its own primary waste treatment facilities on a site adjacent to Cyanamid's layout. Experts studying the situation have estimated that SRA will save taxpayers some \$38,000/year, since capital costs, and amortization expenses will be borne by Cyanamid.

Seminar: Dedication of the new plant followed a two-day pollution control seminar. At the sessions, speakers from Cyanamid, the New Jersey State Dept. of Health, Rutgers University and the U.S. Public Health Service outlined national and state programs for combating air and stream pollution, emphasizing the need for close cooperation—such as the Cyanamid venture—between government, civic, educational and industrial leaders.

Soap Suit On Again

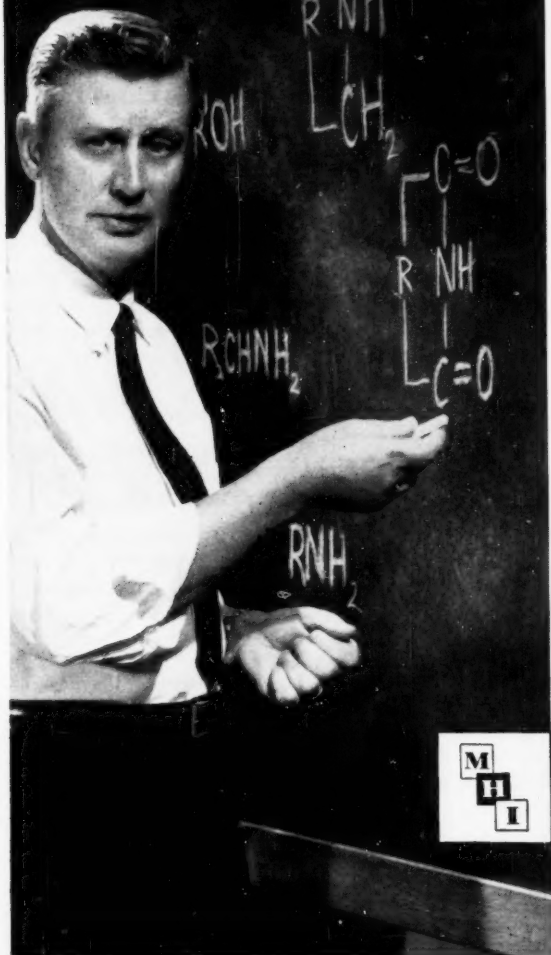
The decision last week by U.S. Supreme Court reinstating a government monopoly suit against the "Big Three" soapmakers (CW Business Newsletter, June 6) has spurred soap executives to arm for battle.

Object: to prove that, as Procter & Gamble President Howard Morgens put it, "the soap industry traditionally has been one of the most competitive in the country . . . [and] the charge of restraint of competition . . . is baseless."

The high court's 6-3 decision, denying that the government must produce grand jury transcripts except where there is compelling necessity, reversed a New Jersey trial court, which dismissed the Justice Dept.'s antitrust suit in '56 because the government refused to let the soap companies inspect the transcript of grand jury proceedings used in preparing the government's case. The government then appealed the dismissal.

Suit Filed in '52: The civil antitrust suit was originally filed Dec. 11, '52, against Procter & Gamble, Lever Brothers, Colgate-Palmolive-Peet and the Assn. of American Soap and Glycerine Producers. The government then charged the companies with using their power over the market to fix prices on soap and raw materials, illegally share patents, and dominate the association.

NOW, MHI LITHIUM ALUMINUM HYDRIDE FOR NITROGEN GROUP REDUCTIONS!



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Of major interest, LAH will reduce these groups in *standard equipment* at room temperature and at atmospheric pressure. This cuts costly setups by eliminating the need for high-pressure hydrogenation equipment. Secondly, LAH provides bigger, more profitable product yields. A powerful, as well as versatile agent, LAH reductions are fast. Equally important, LAH is easy and safe to handle using standard techniques.

The following are typical of many nitrogen-group reductions which can be carried out successfully with LAH:

FUNCTIONAL GROUP	FORMULA	PRODUCT	FORMULA
Imide	$\begin{array}{c} \text{C}=\text{O} \\ \\ \text{R}-\text{NH} \\ \\ \text{C}=\text{O} \end{array}$	Amine	$\begin{array}{c} \text{CH}_2 \\ \\ \text{R}-\text{NH} \\ \\ \text{CH}_2 \end{array}$

The reduction of imides to cyclic amines is analogous to that of amides and lactams consuming a total of one mole of LAH per mole of imide for the reduction of two carbonyl groups to methylenes.

Carbamate	$\text{RNHCOOR}'$	Amine + Alcohol	$\text{RNHCH}_3 + \text{R}'\text{OH}$
-----------	-------------------	--------------------	---------------------------------------

Carbamic esters undergo reduction cleavage to produce mixtures of N-methylamines and alcohols.

Oxime	$\text{R}_2\text{C}=\text{NOH}$	Amine	R_2CHNH_2
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The reduction of oximes forms the primary amines, in general, free from by-products. However, it is frequently necessary to employ forcing conditions to increase the rate of reduction.

Hydroxylamine	RNHOH	Amine	RNH_2
---------------	----------------	-------	----------------

Mono and di-N-substituted hydroxylamines react with LAH to furnish primary and secondary amines, respectively. The oxygen atom in tri-substituted amineoxides is eliminated by the hydride and tertiary amines are obtained.

Azide	RN_3	Amine	RNH_2
-------	---------------	-------	----------------

The reduction of aliphatic and aromatic azides yields primary amines.

The best solvent for LAH nitrogen-group reductions is tetrahydrofuran.

TECHNICAL BULLETIN AVAILABLE. A copy will be sent to you immediately upon request. There is no obligation, of course.

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- Recovery of rare metals and fine chemicals
- Aircraft components and ordnance systems
- Ceramic colors, pigments, and chemicals

ADMINISTRATION KEY CHANGES

M. Lee Rice to vice-president, Atlantic Research Corp. (Alexandria, Va.).

George H. Schulz to senior vice-president, James V. McLaughlin to treasurer and William M. Harris, Jr., to assistant treasurer, American Mineral Spirits Co. (Chicago).

Charles M. McCallister to president and general manager, The National Drug Co. (Philadelphia); and Vladimir Dvorkovitz to president and general manager, Jensen-Selberg Laboratories (Kansas City); both subsidiaries of Vick Chemical Co. (New York).

Joseph J. Laputka to treasurer, Eschbach Chemical Corp. (New York).

Robert E. Lathmer to assistant to the vice-president of engineering, and Robert L. Johnson to coordinator of management development, Air Products, Inc. (Allentown, Pa.).

C. W. Muller to sales manager, J. M. Lehmann Co. (Lyndhurst, N.J.), manufacturer of machinery for the chemical process industry.

Donald J. Collins to general sales manager, Tennessee Products and Chemical Corp. (Nashville, Tenn.).

David W. Miller to director of operations research and statistical analysis, Calkin & Bayley, Inc., (New York), industrial consultants.

ASSOCIATIONS

Cecil E. Carson, director, Imperial Oil Ltd. (Toronto), to president, Chemical Institute of Canada.

DIED

Frederic A. Eustis, 81, director and treasurer, Virginia Smelting Co. (West Norfolk, Va.), at Boston.

Reginald R. Zisette, 57, vice-president and general manager, Jesell Plastics Co. (Kensington, Conn.), at New Haven.

Memo Lisauer, 78, board chairman, Associated Metals & Minerals Corp. (New York), at Bronx, N.Y.

Allan Winthrop Low, 44, director of organic manufacturing, Monsanto Chemical Co., at Springfield, Mass.

CHEMICALS OUTLOOK

June, 1958



This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

NEW PAPER PULPING PROCESS FOR HARDWOODS

During the past few years, a new paper pulping process has been developed. Known as the Cold Soda Process, it is designed to utilize the nation's tremendous hardwood resources.

A principal use of this new process is to produce pulp for newsprint stock. Most newsprint now contains about 20% sulfite pulp and 80% groundwood pulp, both from softwoods.

Information to date indicates that the Cold Soda Process is less expensive than other conventional chemical methods for either hardwoods or softwoods for newsprint, and gives exceptionally good yields. The estimated pulp cost is about 10% higher than for groundwood processes.

In this process, caustic soda solution is used to soften the wood chips. This treatment is followed by mechanical attrition to fiberize the pulp. Because of the chemical softening before milling, a longer fiber is retained in the pulp, with consequent improved paper strength compared to groundwood. This process produces a dark pulp from hardwoods, but bleaching experimentation is now going on to improve the color of the stock. Bleaching to a brightness of about 70 and above now appears possible.

As a batch system, the Cold Soda Process is carried out at room temperature and atmospheric conditions. Unlike the conventional Soda Process, high temperatures need not be used. The wood chips are steeped in caustic soda solution . . . the optimum concentration appears to be about 40 to 50 grams of caustic soda per liter. After completion of the chemical reaction, the softened chips are fiberized in a mill. The process can be shortened by applying moderate pressure to the chips.

A continuous process has been developed, experimentally, to further reduce reaction time. In this method a large drum is used with an internal roller, of a considerably smaller diameter, which applies pressure to the chips. Caustic soda solution is sprayed onto the wood chips, while the chips are alternately compressed and decompressed by the roller for less than one minute. The temperature of the solution ranges between 25° and 60° C.

PROPYLENE-PROPANE STREAM AVAILABLE

Wyandotte now has available tank-car quantities of a propylene-propane stream containing approximately 95% propylene.

For further information on the Cold Soda Process or the propylene-propane stream, write us on your company letterhead. Address inquiries to Department CQ for prompt attention.

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Market Newsletter

CHEMICAL WEEK

June 14, 1958

Russian intent to dominate world aluminum markets may be abortive in the long run, but Red price-cutting tactics are giving U.S., Canadian, and producers in other non-Communist nations a hard time.

A couple of months ago (*CW Market Newsletter*, April 5, April 19), Canada's Aluminium Ltd. reduced prices about 2¢/lb. in an apparent effort to hold markets in the face of competition from low-priced Russian material pouring into England, one of Aluminium's prime outlets. U.S. producers were acrimonious because of the Canadian move, but were "forced" to follow suit. (Consensus here is that the metal's advantages over other materials, rather than price, should be stressed in any hard-sell campaign.)

Latest reports from abroad indicate that U.S. companies have been right—lowering price doesn't help. New Soviet aluminum quotes abroad are said to make U.S. and Canadian prices seem high.

And if domestic producers are in a tough situation now, they'll be in a real bind later on. Aluminum industry overcapacity will be even greater when Ormet Corp.'s new 180,000-tons/year plant swings into full production the end of the year. And next month aluminum makers will come to grips with the 25¢/hour wage hike due to hit the industry. Overcapacity, stiffening foreign competition manifest in rising U.S. aluminum imports, plus slipping demand, would normally indicate a price drop in the offing. But soaring manufacturing costs and a conviction that bargain-pricing aluminum is no jog to demand have caused some major makers to contemplate an increase.

The aluminum picture should clear within the next several weeks—"it can't get any cloudier," says a trade follower.

Divergent price movements were a feature of nonferrous metals last week. U.S. custom smelters hiked copper tags (the third time in as many weeks) to 24½¢/lb.; major lead sellers dropped prices another ½¢, to 11¢/lb.

Despite the frequency of change in smelter copper quotes, domestic primary producers are maintaining the 25¢/lb. price they've held since January.

The weakness in lead has tetraethyl lead makers altering prices again. For the second time in two months, major producers Ethyl Corp. and Du Pont were sending out word of a further immediate cut.

Prices posted by the two companies are on a different basis, but they are equivalent. New Du Pont "compound" prices: 36.26¢/lb. for Motor Mix; 35.86¢, Motor Mix A; and 39.84¢/lb., Aviation Mix. Ethyl's "TEL content" listing pegs Motor Mix at 58.98¢/lb.; Motor Plus, 59.98¢; and Aviation Mix at 64.88¢/lb.

Market Newsletter

(Continued)

More petroleum-derived benzene capacity is in this week. Richfield Oil's initial petrochemical venture (*CW*, Dec. 1, '56, p. 100), and now in operation, is capable of producing some 18 million gal./year. That nearly doubles West Coast output.

The "fully instrumented unit" (can be operated by a three-man crew), costs about \$6.5 million, will also produce, in addition to the nitration-grade benzene, about 18 million gal. of toluene.

Much of the new plant's benzene flow will be aimed at nearby customers, such as Shell's 135-million-lbs./year styrene monomer plant at Torrance, Calif.

A 50-tons/day increase in concentrated nitric acid capacity boosts total output potential of Hercules's Parlin, N. J., plant to 200 tons/day. Also of interest to Eastern acid consumers, says Hercules, "significant" process changes enable the new unit to produce a 99% concentrate of nitric in "normal" production. "This compares," says Hercules, "to the 97% resulting from conventional manufacturing methods."

The new unit was built by Badger Manufacturing; Hercules is prepared to license the process here and abroad.

Italy is a little late with its plastics statistics, but, nonetheless, the data should be noted. Total output last year hit some 277 million lbs., up 13% over '56. Montecatini (Milan, Italy) accounted for 158 million lbs., 57% of the country's total—an increase of 17.3% over '56. The sprawling Italian company's petroplastics cover 11 categories; newest, of course, is polypropylene.

Montecatini's synthetic fibers did even better. Production in '57 was up 18%, compared with the previous year's total. The firm, incidentally, is planning to enlarge its polyamide fibers (nylons) capacity "in the near future."

SELECTED PRICE CHANGES — WEEK ENDING JUNE 9, 1958

	Change	New Price
UP		
Ethyl cellulose, 5,000 lbs. or more, bgs., frt. allowed, E.	\$0.03	\$0.73
Tin metal (Straits)	0.0025	0.95
DOWN		
Creosote oil, crude, tks., wks., frt. adj., gal.	0.04	0.20
Lead, metal, prime pigs, New York	0.005	0.11
Lead, red, 95% oxide, bbls. c.l., wks., frt. equald.	0.005	0.1325

All prices per pound unless quantity is stated.



Enjay Butyl is used in the new Willys 'Jeep' FC-150 Truck—as weather strips, transmission mountings, small extrusions for doors.

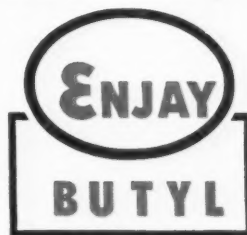
ENJAY BUTYL

Improves performance, cuts costs in new 'Jeep'

The new Willys 'Jeep' "Forward Control" Truck features all-direction visibility. The more than 2,700 square inches of glass demanded a window-sealing material that would *stay* firm and weather-tight for the life of the truck. Supplier B. F. Goodrich Co. chose Enjay Butyl for weather-stripping because of its exceptional resistance to weather and aging. A tighter, longer-lasting seal is assured by the well-

known vibration and shock-absorption qualities of Butyl—an important factor in this rugged-duty 'Jeep.'

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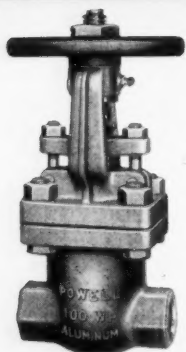


Fig. 2442AL — Aluminum O, S. & Y. Gate Valve for 100 W. P. at 350F. Especially advantageous in laboratories and process plants for piping distilled water and handling acetic and nitric acids. Flanged end valves also available.

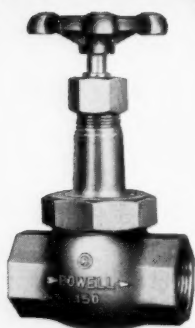
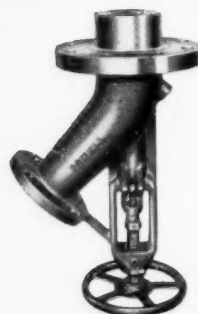


Fig. 2600 — New 150-pound Bronze Full Flow Globe Valve. 500 Brinell hardened, stainless seat ring and disc. Nominal pipe size seat opening and extra high lift of disc assure full flow with minimum pressure drop and turbulence. Can be supplied with indicator collar and arm for visual control. 200 and 300 pound valves also available.



Small Flush Bottom Tank Valves for 150 W. P. made in two designs: Fig. 2172 disc opens into tank; Fig. 2173 disc opens into valve. Available in a number of metals and alloys; also for 300 and 600 W. P.



Fig. 2343 — Swing Check Valve for 150 W. P. Bolted Cap. Made in Monel Metal, Nickel and Hastelloy Alloys B-C; and with flanged ends. Valves of this design can also be furnished in stainless steels.

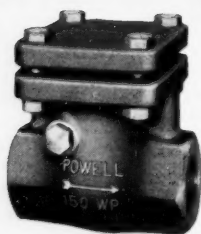


Fig. 2107BSW — (Sectional) — Stainless Steel Bellows "Y" Valve for 150 W. P. Designed for high vacuum service for controlling the flow of heavy water, molten metals and all hazardous, lethal and malodorous fluids.

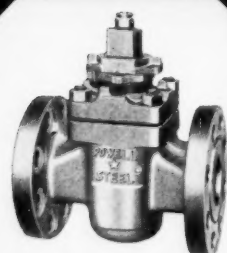


Fig. 1559 — Steel Lubricated Plug Valve for 200 pounds, W. O. G. — A. S. A. 150 pounds. Screwed gland type. Single gland and bolted gland types also available. Large valves—6" and above—can be supplied with gears for gear operation.

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CW Report

All large-scale continuous-process operations periodically shut down for maintenance overhauls.

But, in many process companies, shutdowns are confusing, haphazard procedures.

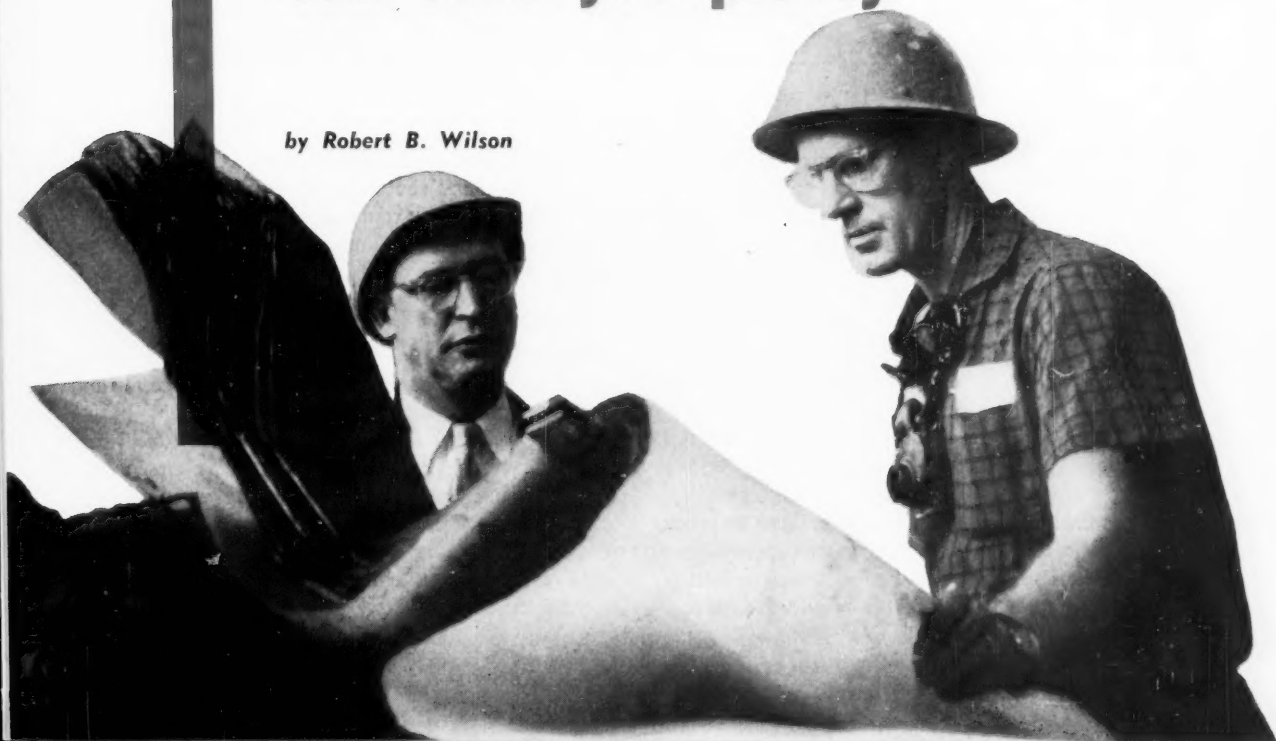
Result: production time losses and indirect costs are unduly high.

Remedy: organization and scheduling.

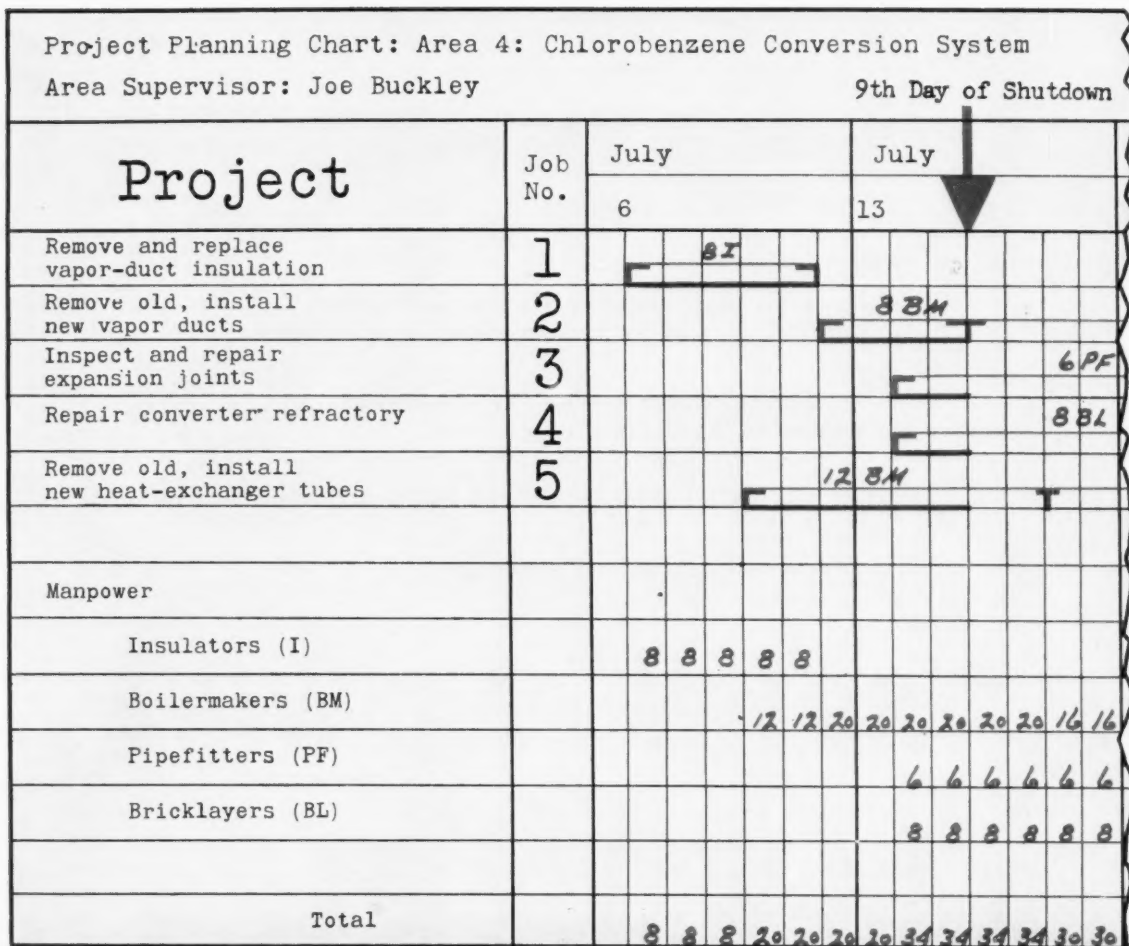
SHUTDOWN PLANNING

can save you plenty

by Robert B. Wilson



For Maximum Efficiency, Make a



THE kind of project planning chart shown here can be a plant manager's blueprint for cost reduction. The chart is a master plan for a plant shutdown—an operation that most chemical process companies face once, twice, and sometimes more often, each year. Processing is interrupted while maintenance and engineering crews wrestle round-the-clock with cleanup, repairs, expansions and improvements.

Accomplishing these shutdown jobs as quickly and economically as possible is the company's main goal. Lost production time means lost profits—up to tens of thousands of dollars a week for some plants.

With better shutdown planning, one large chemical process company was able to do three times as much work in one week less time than previous shutdowns required. The company gained a week of production time (worth more than \$50,000 in profit to this firm).

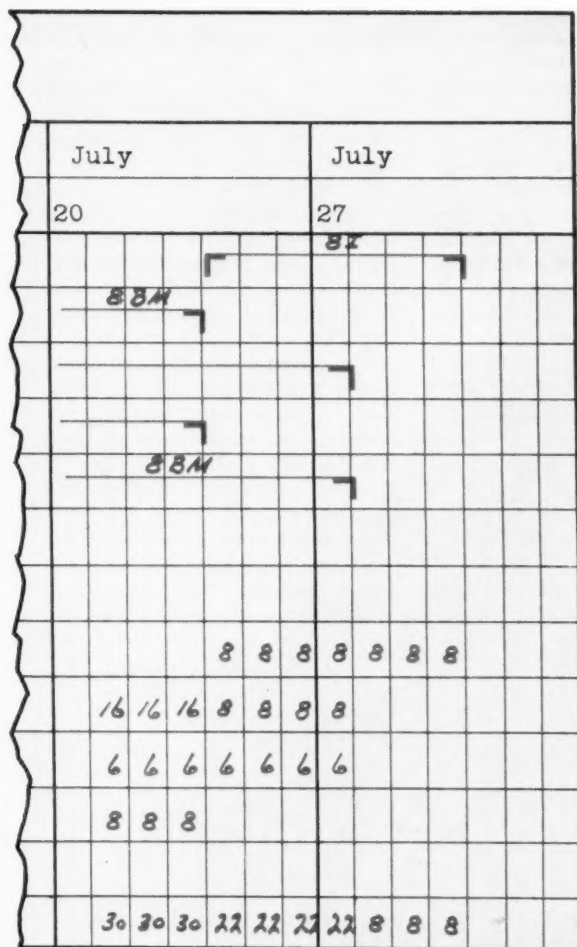
This company had customarily been careful about its maintenance and shutdown controls, but management felt there was still room for improvement. Detailed review of shutdown planning and control procedures revealed these basic faults:

- Some shutdown jobs were not being unplanned.
- Many routine maintenance jobs were being deferred until shutdown.
- More liaison was needed between engineering and maintenance departments.
- Many delays were unspotted because supervisors weren't checking progress planning charts often enough.

Remedying these defects netted the company substantial gains. Comparable gains can be made in every company that has neglected to tighten up this particular area of management control.

Take the case of a big papermill that shut down com-

CW Report



Here's how a project planning chart (sample, left) works. Before shutdown begins, right angle connected by light, colored lines are drawn in to fix the order and duration of each job. Job progress is shown by daily drawing in heavy, colored lines. Daily manpower requirements are totaled at the bottom for each craft. This chart is in the ninth day of a 23-day-long shutdown.

- 50% of the firms gather little or no data on actual shutdown costs. Without this information, management is stymied when it tries to figure annual costs.
- 41% of the companies postpone routine maintenance jobs until shutdown. They assume that these jobs are handled easier during shutdown. But this policy needlessly prolongs downtime because the skilled workers required for important shutdown jobs are occupied with excessive routine maintenance work.
- 23% of respondents admitted that their preplanning for shutdowns is unsatisfactory. And 34% of the surveyed companies never estimate labor and material requirements in advance of shutdown.

The survey confirms many top managers' suspicions that there's plenty of room for improving shutdown operations in their own plants. Shutdown control, moreover, is needed more now than ever before. With capital investment costs steadily increasing, profits hinge on the company's ability to maintain the highest possible operating ratios.

Automation intensifies the need for reducing downtime costs, which are higher in automated plants. Shutdown of one unit can mean shutdown of an entire highly automated plant. A recent Du Pont study showed that in a 50-unit integrated system, the entire system failed to operate when one component was down 10% of the time.

Mounting production and maintenance labor costs demand closer shutdown control. *CW's* survey revealed that in the companies queried, 23% of all plant labor was for maintenance; and the process plant of tomorrow will have an even higher ratio of maintenance to production workers. Shutdown costs in one plant were as high as 50% of annual maintenance costs. Temporary or subcontract labor, mustered at shutdown time, comes at a premium, is only about 50-70% as effective as a company's own labor force, survey respondents themselves said. By diligent management of shutdowns, process company executives can cut labor outlays.

COOPERATIVE EFFORT

Shutdowns cannot be considered apart from (1) the engineering of process improvements and expansions, (2) long-range planning for major project changes and additions, (3) purchasing and expediting of needed

pletely every seventh day. The maintenance force of this plant presented a labor grievance stating that after working full shifts six days the men had to put in too much overtime on the seventh day doing shutdown chores. By planning shutdowns more carefully, the company reduced needs by more than 200 man-hours a week, eliminated overtime Sunday work, settled the labor grievance.

The fact is that few shutdowns come off with maximum speed and minimum cost. This is apparent from the results of a *CW* survey of individual and industry-wide shutdown practices; 33 companies were queried. Here are the highlights of the findings:

- 20% of the respondents lack a definitive shut-down policy. These firms do not run their plants until they break down; but it is safe to assume that their downtime costs are needlessly high.

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shutdown materials, (4) day-to-day preventive maintenance, (5) cost accounting.

Top-level decisions are needed to fix the frequency of shutdowns and extent of work to be done during a shutdown. Taking on outside help is also a top-management decision.

Engineering and maintenance executives must plan and execute the shutdown within the framework of these higher decisions. Production and sales executives feel the pinch of curtailed production during shutdown. Purchasing executives are called on to perform important functions before shutdown. Accounting heads are responsible for translating shutdown into dollars and cents of profit or loss. Shutdown, then, is an over-all management problem.

Here are six working rules of good shutdown planning:

1. Review Records. Analyze past maintenance cost records and reports on frequency of equipment breakdown to help decide whether to shut down once, twice, or more often, each year. This assumes, of course, that such records are not only available but also sufficiently detailed.

2. Bill of Work. Compile a list of all major plant improvements that might be incorporated into the shutdown plan. Estimate labor, material and time requirements for each project. Be sure that the combined material, time and labor requirements do not constitute too big a package for one shutdown. Prepare an attainable bill of work well in advance of actual shutdown.

3. Materials. Order all needed materials—special and standard—and follow up on their acquisition well in advance of shutdown. Special materials usually receive greater attention from engineering, maintenance and purchasing departments. Don't neglect standard materials for which sudden demand may develop during shutdown. A shortage of standard materials can place a company in the costly position of losing the shoe for want of a nail.

4. Job Sequence. Plan every shutdown job—minor as well as major—and its sequence. One of the most common errors of shutdown planning occurs when supervisors fail to do this. Poor sequence planning of jobs could mean, say, that carpenters and



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Meet Author Robert B. Wilson



CW PHOTO—WILLIAM MC ALLISTER

Robert B. Wilson (B.S., '40, Drexel Institute of Technology) is vice-president of Wallace Clark & Co., New York firm of management consultants, which was acquired last November

by Frederic R. Harris, Inc. Harris is well known for its work in port-development engineering, is currently building a practice in other engineering fields.

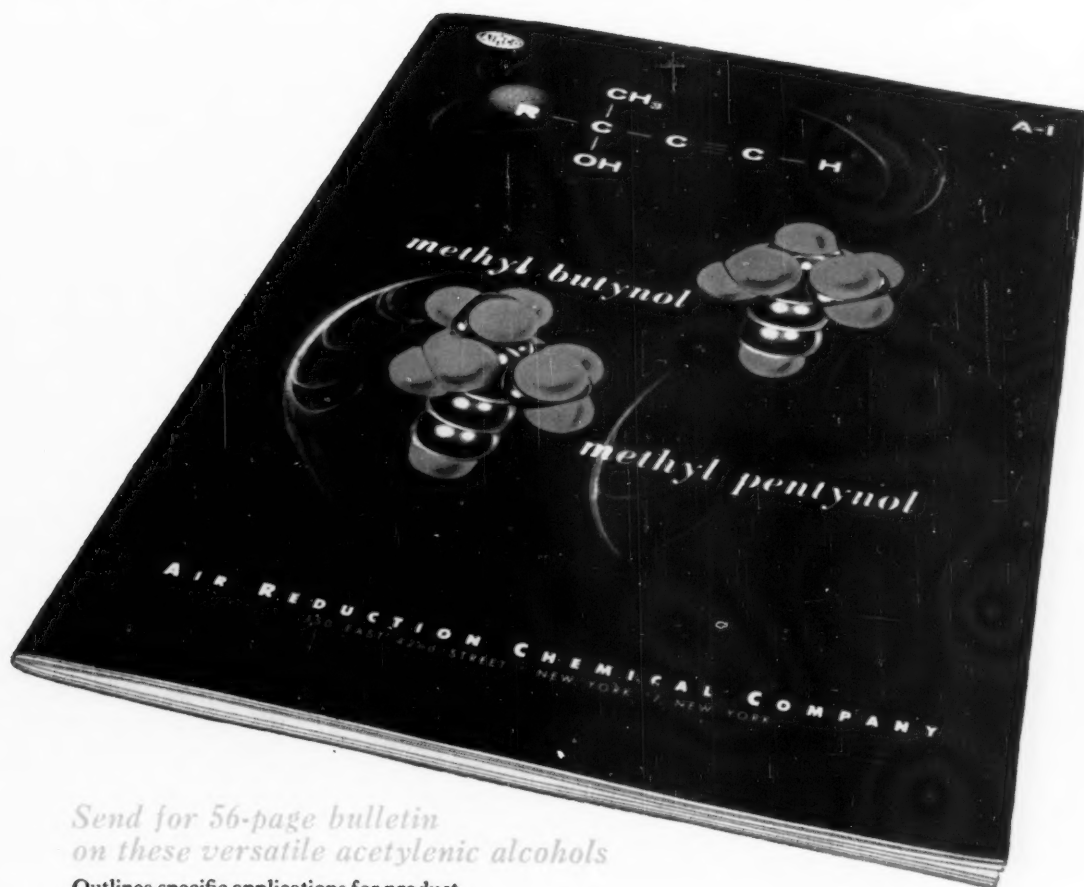
Maintenance policy as it relates to over-all corporate management has occupied most of Wilson's business career. Some of his clients: Rayonier, Inc.; American Maize Products Co.; Container Corp. of America; Bakelite Co. (Division of Union Carbide Corp.).

Wilson feels that his work does not end with a recommendation on the solution to a client's problem. He and his staff prefer to work closely with management personnel in fashioning a solution, piloting it and finally getting it to work as part of standard operating practice. Observations made in this article are drawn from this kind of practical approach to shutdown problems in the chemical process industries.

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electricians must be kept waiting (on full pay) while riggers and millwrights finish their work. Ignoring a series of minor routine maintenance jobs, each seemingly too small to be worth planning, can wreck the overall shutdown plan and skyrocket downtime costs.

One good way of preparing a detailed plan of work that can be accomplished during shutdown is described later in this report.

5. Execution. Carry out the shutdown plan meticulously. Take progress readings several times a day (every hour for some jobs) and re-group labor forces as required. Employ a project planning chart (see p. 96) that shows where every job stands at any time. Act promptly to eliminate lost time and to prevent delays.

6. New Records. Record labor and material costs for each job. Only in this way will management later be able to compute shutdown costs, combine these with routine maintenance cost data and arrive at true annual maintenance and shutdown costs. Such collected data can serve as a valuable reference base in planning future shutdowns and measuring subsequent shutdown performance.

Elementary as these rules may appear, they are too often ignored during shutdowns. Result: unexplainable delays and higher-than-anticipated shutdown bills.

GETTING THE JOB DONE

Shutdown is best accomplished in three stages: planning, execution and review. Planning is the most important. Unless shutdowns are meticulously thought out in advance, execution will fall far short of expectations.

Top administrative or engineering management gives the go-ahead to shut down. Plant managers take over the responsibility of planning and executing the shutdown, for successful shutdowns can be accomplished only by staffers who are close to plant maintenance problems.

For close control, a shutdown coordinator should be appointed. He assumes responsibility for making major job assignments and executing the shutdown plan. He may be an engineer, plant manager, or other qualified engineering or maintenance department staffer. The shutdown co-

ordinator (or his designated alternate) must be available at all times during shutdown to make major decisions.

It's practical to divide the entire plant into areas, each under the authority of an appointed supervisor (foreman rank or higher), who directs the men assigned to him (including outside laborers) and who can further plan work within his area. His important responsibilities: (1) seeing that jobs in his area are completed on time, (2) maintaining performance records, (3) reporting problems outside his authority to the shutdown coordinator.

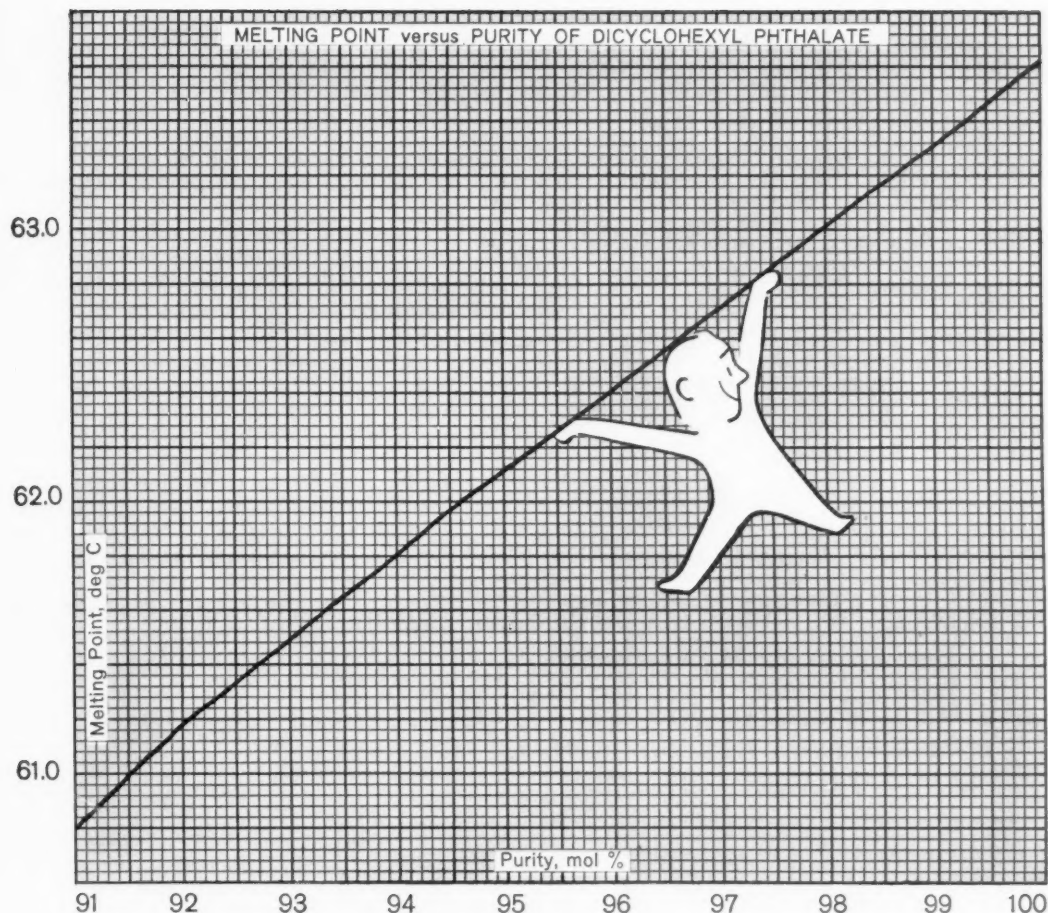
Planned shutdown involves much record-keeping. For that reason, area supervisors should be given whatever clerical personnel are needed to monitor planning charts and to follow up such forms as work orders and daily order of work sheets.

Fit in the 'Change Projects': As a process company's business expands, its production capacity must keep pace. This requires changes in process design or plant additions—called "change projects" by engineering departments. Where expansion is not a separate project in itself, as in the building of a completely new plant, change projects are best fitted into shutdowns.

Engineering departments should employ Gantt-type charts (or similar schematic devices) to ensure that change projects are engineered in time for shutdown. [The project planning chart (p. 96) is a Gantt-type chart, but it usually does not include manpower requirements for the engineering of change projects.] The engineering department posts its Gantt charts, orders speedup on projects that are obviously falling behind schedule. In this way, change projects are readily fitted into shutdown.

Figure Needs with Work Orders: Once the shutdown decision is made, labor, material and time requirements for each job should be figured on work orders—forms that provide spaces for recording estimated and actual requirements for each job. Maintenance supervisors should split big projects into components that, in turn, can be conveniently broken down into labor, material and time elements.

Purchase requisitions are written from work orders, then sent to the



Exercise in Plasticizer Purity

Measure the melting point of DCHP, locate it on the above graph and you have an accurate purity measurement. Original work on purity standards is part of extensive Barrett Research in the improvement and development of plasticizers.

You may or may not have any interest in the fact that Dicyclohexyl Phthalate apparently obeys Raoult's Law. But if you use plasticizers, you will be interested in a by-product of that fact: Melting points can be used to determine purity. It is really Raoult's Law, and all the by-laws that go with it, that permit you to calculate the purity of DCHP from the above graph.

If you're a bug on purity (and what plasticizer user isn't?) you may want to preserve this graph and use it to check up on DCHP specifications. Of course, if the sample under consideration is ELASTEX® DCHP, you

needn't bother. The melting point test is one of the many fitness tests we perform on our DCHP.

The procedures that Barrett research people used to plot this simple graph are worth knowing about. But they are so complex they defy description in this limited space. Precision investigations of this kind are an old story with our laboratories. In fact, we count our immense backlog of plasticizer data among our prime assets. Perhaps you could use a supplier who is well qualified to act as your technical consultant. That's one of the advantages of doing plasticizer business with Barrett.

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purchasing department. The maintenance department keeps an action copy of the work order, notes on this the receipt of materials. When all materials are on hand, the job is ready for scheduling.

Before the actual shutdown begins, the use of one other control form is recommended. That's the daily order of work, called a DOW sheet, a form that is used daily for scheduling each job on an hour-by-hour basis. These sheets are best prepared before the close of work for the next day. They keep track of all incomplete chores. Schedule changes are noted on the DOW form, and job progress is posted to the master project planning chart.

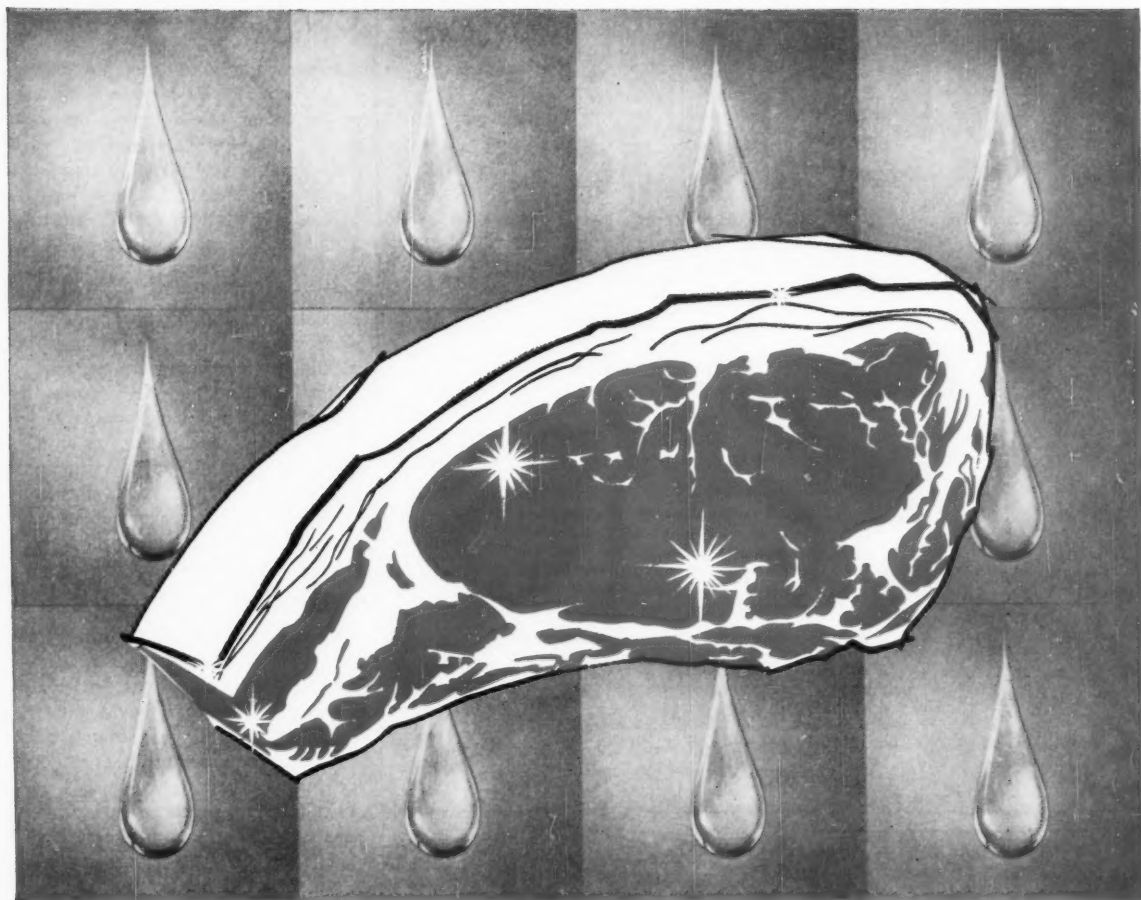
With the detailed planning and control described above, execution usually comes off with few or no hitches. Deviations from the plan can arise only from unexpected situations.

As work proceeds, progress is posted from the daily order of work sheets to the project planning chart. Posting is done periodically, the intervals depending on the length of shutdown. (A "V" is drawn at the top to indicate the time of posting.) Daily posting is advisable — sometimes it must be done more often. For shutdowns lasting more than one week, prepare master charts on vellum paper, using paper copies for daily posting. Vellum master charts may be brought up to date at the end of each week of shutdown. Paper copies may be sent to top management daily, used for administrative purposes.

The project planning chart is the one record that must be reviewed continually to spot trouble areas that require immediate action, if shutdown is to be kept moving on schedule. Action may take the form of realigning or adding manpower, or closer supervision of behind-schedule activities. In this way, disruption of the whole plan can be avoided and the startup target date met.

Contrary to practice in many companies, completed project planning charts should be preserved as records of the shutdown operation. They are essential for developing future shutdown plans.

Managers are frequently too anxious at the end of shutdown to get back to their primary duties. It's wise, however, to take time out to review the shutdown in detail from



A "liquid dip" for wrapping meat

A more attractive way of packaging frozen meat is now being tested. It's an all-around airtight wrap that seals in fresh red color that's ordinarily lost after freezing. The process is simple: An initial immersion in an ethyl cellulose base hot melt followed by a liquid dip in the insulating coating of which one of the ingredients is glycerine. The glycerine acts as a plasticizer and humectant. It helps keep the package clear and prevent slip.

Another approach is described in a recent Belgian patent. This time a dip of hot 60-80% Glycerine solution heat-seals

polyethylene into an airtight film around the meat.

Ideas like these can be extended throughout the whole world of packaging. They're examples of the many things to come with Glycerine. And more, the unique balance of properties that won such wide acceptance for Glycerine in the past will surely continue to open new doors to chemical progress.

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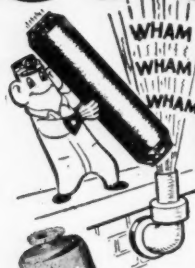
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GLYCERINE PRODUCERS' ASSOCIATION • 295 MADISON AVENUE, NEW YORK 17, N. Y.

June 14, 1958 • Chemical Week

103

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—from the discharge to atmosphere of air, steam and other gases, with a Burgess-Manning Snubber. They are available with such plus features as: spark arresting; air cleaning; heat recovery; and surge control.

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CW Report

accurate reports of the entire operation. These may be prepared manually or by machine, depending on their complexity. Purchase orders, work orders and project planning charts are the sources of data for these reports.

Shutdown reports should include actual vs. estimated material, labor and man-hour requirements for each job, project, plant or process area. Reports of this kind: (1) provide management with the detailed cost information it needs for putting a dollars-and-cents tag on shutdown and (2) provide maintenance executives with clues to repetitive or potentially repetitive maintenance situations. Process equipment that requires constant overhaul, repair or replacement can be singled out as targets for engineering development.

CONTRACT MAINTENANCE

Contract maintenance firms have long been extolling the advantages of farming out all or part of maintenance. Furthermore, they say, it's the easiest way to fill peak maintenance manpower requirements that arise during shutdown periods.

Contract maintenance is especially popular with petroleum refiners; many big chemicals processors also subscribe to the idea. But there's still lack of agreement in the industry, especially at the plant operating level, concerning the benefits and shortcomings of contract maintenance (*CW*, Aug. 3, '57, p. 52; *Farm Out Your Maintenance Headaches?*).

Contractors supply whatever skilled and supervisory manpower is needed to plan, execute and manage maintenance and shutdowns. But company management is still responsible for controlling and justifying maintenance expenditures. The contracting firm is in the position of a service buyer, the contractors in the position of a service seller. Evaluation of quality of service, time of service and the cost of work are up to management.

Only by comparing costs with results can process company executives satisfactorily determine whether contract maintenance is the ready answer to their maintenance and shutdown problems.

Reprints of this *CW* Report are available for \$1 each. Order from Reprint Dept., *Chemical Week*, 330 W. 42nd St., New York 36, N. Y. Bulk rates on request.

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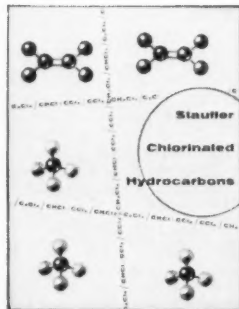
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"MEXICO" BO-8149 Chemical Week
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Challenging position for aggressive trader with proven record in international sales of bulk pharmaceuticals.

Applicants should have good knowledge of organic chemistry; knowledge of foreign languages preferred. Good starting salary commensurate with qualifications plus incentive participation. Age: 30 to 40.

P-8188 Chemical Week
Class. Adv. Div., P. O. Box 12, N. Y. 36, N.Y.

Positions Wanted

Sales Manager, Successful director of chemical sales for 18 years in southwest. Salary expected \$20,000.00 plus. Reply PW-8177, Chemical Week.

Research Chemist: Ph.D., 25 years of diversified experience in organic and industrial chemistry, presently active in surfactant field, desires responsible position. PW-3146, Chemical Week.

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CHEMICAL SALES

Petrochemical raw material manufacturer needs more chemical salesmen to further enlarge marketing staff for nation-wide sales to paint, plastics, rubber, petroleum and chemical industries. Excellent opportunity for men 25-38 who meet these requirements.

1. Minimum BS in Chem. or Ch.E.
2. Two or more years' experience selling organic chemicals to industry.
3. Ability and strong desire to advance as company grows.
4. Self-motivation.

Company is completely integrated subsidiary of one of the nation's top twenty industrial corporations. This assures our employees stability, security and liberal benefits. In addition, the relatively small size of Amoco Chemicals assures recognition of individual achievement. Salary commensurate with experience and demonstrated ability. Give details of age, education and experience in first letter.

H.F. Holdridge

Amoco Chemicals Corporation
910 South Michigan Avenue
Chicago 80, Illinois

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Chemical Engineer with broad experience in rayon & nylon for feasibility study of synthetic fiber manufacture. Foreign travel required. P-8098, Chemical Week.

Sulphur Sales—Immediate opportunity in sales of crude sulphur for established producer. Proven sales ability essential, preferably on sulphur, heavy chemicals, or related fields. Background of production experience in sulphuric acid, pulp and paper, helpful. Location: Progressive southern city. To investigate the position in strictest confidence, please include personal data, experience, education, and salary requirements. P-8166, Chemical Week.

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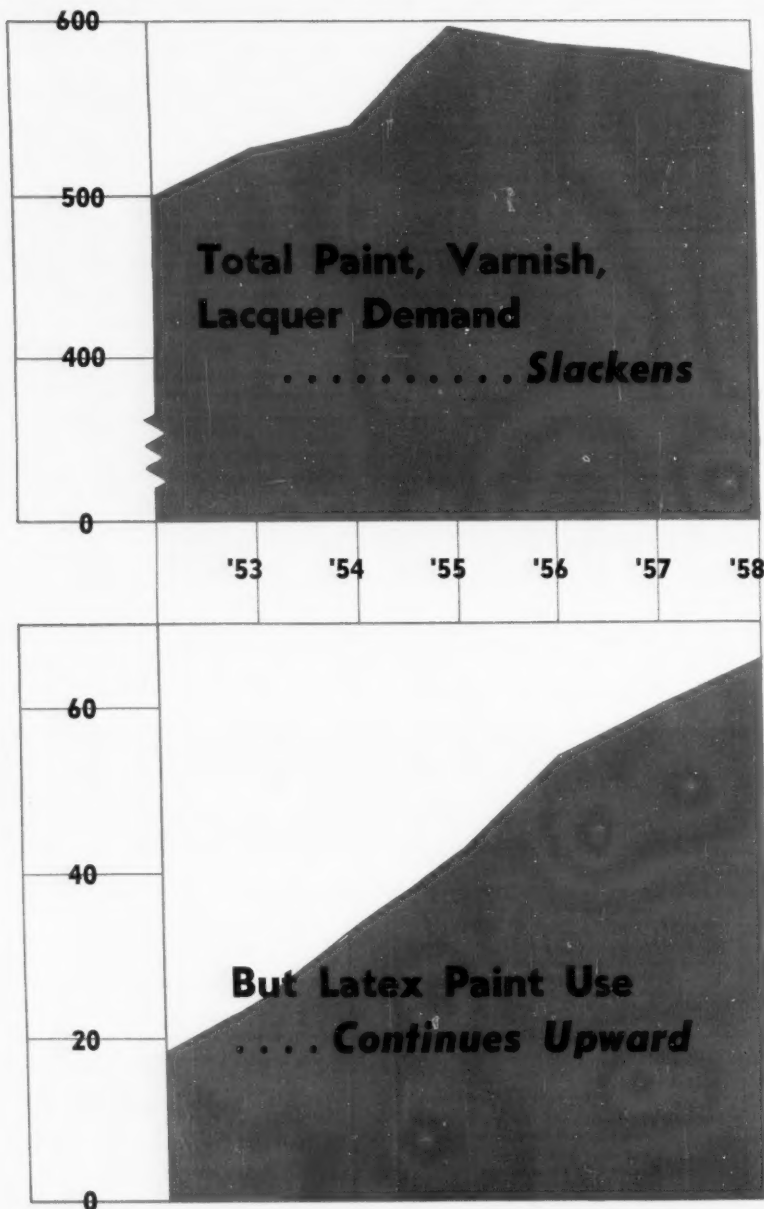
CHARTING

BUSINESS

June 14, 1958

Latex Paints: Now 13% of U.S. Paint Pail

Est. million gallons



By the end of '58, according to trade estimates, use of latex-based paints made with butadiene-styrene, polyvinyl acetate or acrylics will have reached some 66 million gal. That's nearly 13% of the total 570 million gal. of paint, varnish and lacquer expected to be used this year. Six years ago, latex paints supplied an insignificant 4% of the total protective-coating market. While total gallonage of paints, varnish and lacquers sold has been decreasing since '55, the gallonage of latex protective coverings has been increasing at a rapid pace.

Latex paints have already made deep inroads into the indoor paint market, are now moving into outdoor applications. This year, Ford and Chrysler Corp. are using the water-thinned primers on some automobile models. This is one market heretofore dominated by alkyd-based paints.

Already hurting makers of synthetic-resin paints, latex paints are expected to have sales of at least 92 million gal. by '62, slicing out still more of the potential market.

How are synthetic-resin paint producers meeting this challenge?

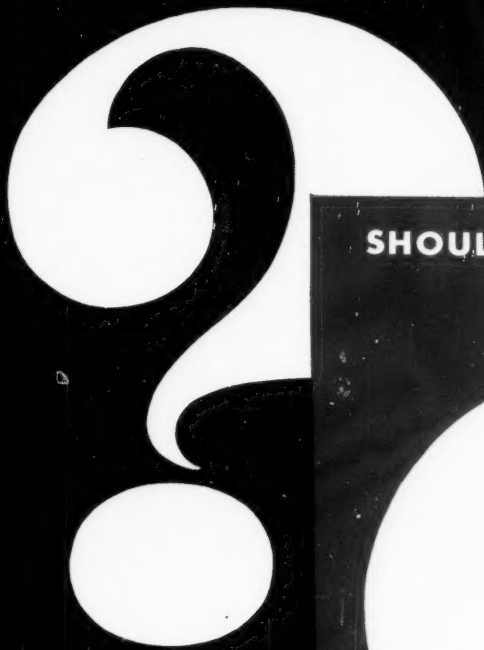
- Through intensive research, several improved alkyd emulsion paints—also water-thinned—have been developed. They are now marketed.

- A strong promotional campaign to recapture some of the market lost to latex paints is being considered.

But, consensus is that despite these efforts latex-based paints will continue to dig further into the protective coating markets, at the expense of alkyd-based paints.

Whichever type of paint gains in the protective-coating market, consumers are certain to benefit—makers are not only boosting their sales efforts but also improving their products.

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2

More and more manufacturers are considering this question today, as the use of oxygen in industry continues to expand.

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But if your demands are such that you could profitably install your own bulk oxygen producing equipment, Messer's broad experience can help to assure you of the most efficient plant for your particular needs. We will welcome an opportunity to talk with you.

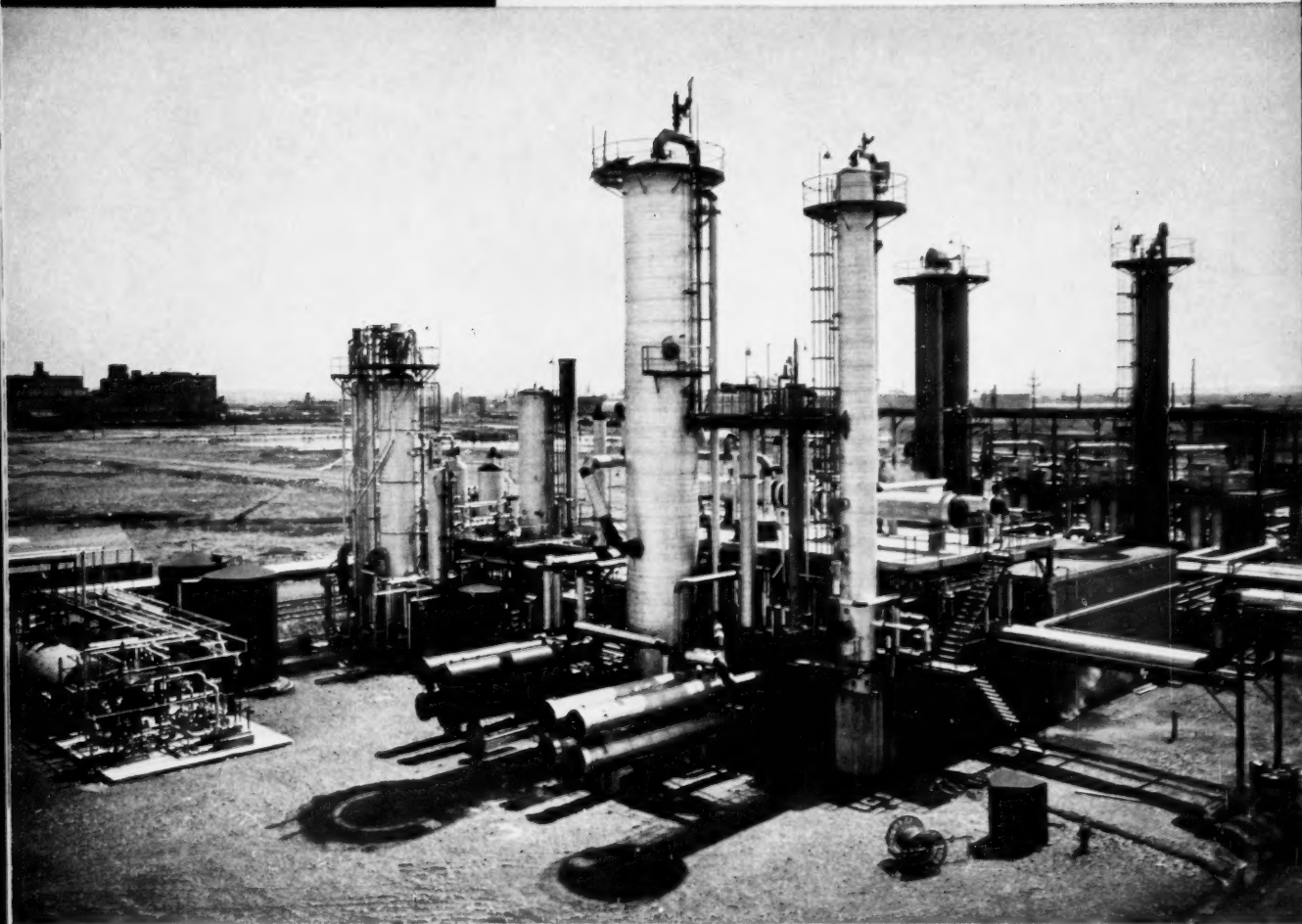
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New ethylene oxide-glycol plant of General Aniline and Film Corporation located in Linden, N. J., easily seen from the New Jersey Turnpike.

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- Catalyst
- Start-Up

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yields above guarantees and products meeting exacting commercial specifications of purity.

Only SD can assume complete responsibility for *all* phases of an ethylene oxide project, including the furnishing of its own process and catalyst as well as complete design, construction and start-up services.



Scientific Design Company, Inc.

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